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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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Vol. 18 NEW YORK, FEBRUARY, 1920 No. 2

ELECTRIC FURNACE PROGRESS

THE RAPID INCREASE OF THE USE OF ELECTRIC FURNACES FOR MELTING AND HEATING METALS.

The outstanding business development of the past year or two has undoubtedly been the spread of the use of the electric furnaces in the metal field. A few years ago electric furnaces were barely known; a laboratory appliance, and an occasional experimental installation which turned out to be a freak. Now, however, more than half a dozen reputable manufacturing concerns are turning out these furnaces and have made scores of installations, which are working constantly and in most cases giving complete satisfaction. So far the branches of the industry to which electric furnaces have been applied are the following:

Rolling Mill
Foundry
Smelter
Heat Treating
Baking, Etc.

For descriptions of the various types and makes, see THE METAL INDUSTRY for 1917, 1918, 1919.

It will be most interesting to note the effect of the electric furnace on the other branches of the metal industry. So far we have had no authentic or detailed information, but we have gathered from various scattered sources, and have received opinions which seem to point out that two businesses at least may suffer, the crucible and the fuel furnace business. It is quite apparent that fuel furnaces will be the first to feel the attack of such a development. With the easy control of the conditions in the electric furnace, the fuel furnace finds itself in a very difficult position. Also it seems that the ease of operation and the general cleanliness and simplicity are to the credit of the electric furnace. However, fuel furnaces such as the open flame type, oil or gas fired still have some items decidedly in their favor. They are flexible in operation, they can be used on any sort of metal, their charge can be varied, they can be operated for short, long or intermittent periods, and last but not by any means least important, they are very much less expensive.

The crucible is the same position as the open flame furnace. It held its position successfully against the attack of such a furnace simply because it turned out a better grade of metal. In spite of the natural disadvantages, namely, excessive amount of hand labor, the low output, the rapid deterioration and consequently greater operating cost, it could not be displaced because of the quality of the material which it produced. In competition with the electric furnace, however, it is facing an entirely new enemy. The electric furnace attacks the crucible not only as regards capacity and low cost of output, as did the open flame furnace, but also as regards the quality of the metal produced. It is quite evident that if the electric furnace can produce as good material, and in larger quantities than the crucible, it will be the logical choice. Nevertheless, as it stands, there is much still to be done before the electric furnace will completely replace both the open flame and the crucible furnace. However, the Ajax Metal Company report that they have developed the Northrup type of furnace which promises well to compete in the field of furnaces whose flexibility is required.

The old types of furnace called for very skilled and highly specialized labor. The metal melter was a man to be valued. It remains to be seen just what effect the electric furnace will have in this respect. It is certain that skilled electricians will be needed to keep it in repair. Whether or not it will need the service of a skilled melter to judge the condition of his metal, time for pouring and the rapidity of pouring will have to be seen.

As an indication of the surprisingly rapid spread of the electric furnace, the following tables show, so far as we have been able to find out, how many of each type of furnace are in use and for what purpose. There are several types omitted because it was impossible to obtain sufficient information to publish safely. Those shown, however, are complete up to the time of the compilation of this list, about January 15, 1920.

BAILY ELECTRIC FURNACE, MANUFACTURED BY THE ELECTRIC FURNACE COMPANY, ALLIANCE, O.

Plant	Melting	Total Furnaces at present	Type	Electrical Capacity of each in K.W.	24 Hour Capacity of each in tons	Total Daily Tonnage
Wm. A. Rogers, Ltd. Buffalo, N. Y.	Silver for dinner ware	1	Pit crucible	40	1½	1½
Lumen Bearing Co., Buffalo, N. Y.	Yellow brass lumen manganese bronze for bearings	3	Tilting	105	8	24
Baltimore Copper Smelting Co., Baltimore, Md.	Yellow brass ingot	1	Tilting	105	8	8
Hays Mfg. Co., Erie, Pa.	Yellow brass for plumbing goods	1	Tilting	105	8	8

Aluminum Co. of America, Massena, N. Y.	Refining aluminum.....1	Rectangular	500	24	24
Anaconda Copper Mining Co., Butte, Mont.	Yellow brass casting electrolite zinc 2	Tilting and Rectangular pusher	105 1000	8 200	208
Euclid Glass Division, Cleveland, Ohio.	Glass tubes for electric lights...1	Pit crucible	40	1½	1½
Penberthy Injector Co., Detroit, Mich.	Yellow brass for valves and injectors 1	Tilting	105	8	8
Standard Sanitary Mfg. Co., Louisville, Ky.	Yellow brass for plumbing goods and manganese bronze.....5	Tilting	105	8	40
Michigan Smelting & Refining Co. Detroit, Mich.	Yellow brass ingot and rolling mill slabs.....5	Tilting	105	8	40
McRae Roberts Co., Detroit, Mich.	Yellow brass for automobile parts 3	Tilting	105	8	24
Buick Motor Co., Flint, Mich.	Phosphor bronze for automobile parts 2	Tilting	105	8	16
Electric Furnace Co., Salem, Ohio.	Test runs on brass, bronze, zinc and aluminum 5	Tilting	105 50	375	26
Capitol Brass Co., Detroit, Mich.	Yellow brass for valves and fittings 2	Tilting	105	8	16
Akron Bronze & Aluminum Co., Akron, Ohio.	Yellow brass, red brass, gun metal and aluminum 2	Rectangular Tilting	50	2	10
		Tilting	105	8	
Nolte Brass Co., Springfield, Ohio.	Yellow brass for valves and fittings 1	Tilting	105	8	8
Kennedy Valve Co., Elmira, N. Y.	Red brass for valves 1	Tilting	105	8	8
U. S. Navy, Washington, D. C.	Yellow brass 1	Tilting	105	8	8
Dayton Eng. Laboratories, Dayton, Ohio.	Aluminum for Delco products..1	Tilting	105	8	8
G. Amsinck Co. of Mexico, Mexico City, Mex.	Yellow brass 1	Tilting	105	8	8
Lamson & Sessions Co., Cleveland, Ohio.	Heat treating bolts 1	Hearth	40		
Drew Electric & Mfg. Co., Cleveland, Ohio.	Yellow brass 1	Tilting	105	8	8
American Bronze Corp., New York City.	Bronze 2	Tilting	105	8	16
Doehler Die Casting Co., Brooklyn, N. Y.	Yellow brass 1	Tilting	105	8	8
Deming Co., Salem, Ohio.	Yellow brass and valves 1	Rectangular Tilting	50	2	2
Dominion Steel Products Co., Bradford, Ont.	Yellow brass 1	Rectangular Tilting	50	2	2
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.	Yellow brass 1	Rectangular Tilting	50	2	2
Landers, Frary & Clark, New Britain, Conn.	Aluminum 1	Rectangular Tilting	50	1½	1½
Miller Pasteurizing Mach. Co., Canton, Ohio.	Yellow brass 1	Rectangular Tilting	50	2	2
White & Bros. Co., Philadelphia, Pa.	Yellow brass 1	Tilting	105	8	8
Union Brass & Metals Co., St. Paul, Minn.	Yellow brass 1	Tilting	105	8	8
American Hardware Corp., New Britain, Conn.	Yellow brass 1	Tilting	105	8	8
West Virginia Metal Prod. Corp., Fairmount, W. Va.	Yellow brass 2	Tilting	105	8	16
Mitsui & Co., Japan	Yellow brass 1	Nose Tilting	105	8	8
Roberts Brass Co., Detroit, Mich.	Yellow brass 3	Tilting	105	8	24
Parrish & Pool, Cleveland, O.	Yellow brass 1	Nose Tilting	105	8	8
Wasson Piston Ring Co., Plainfield, N. J.	Grey Iron 1	Tilting	50	2	2
Kaylin Co., Cleveland, O.	Yellow brass 1	Tilting	50	2	2
TOTALS			61 Furnaces		617½

Detroit Rocking Electric Furnaces, The Detroit Electric Furnace Company, Detroit, Mich.

Firm.	Location	Number & Sizes of Furnaces	Character of Product
Aluminum Castings Company....	Detroit, Mich.....	2—2000 lb.	Bronze Castings
Chas. B. Bohn Foundry Company	Detroit, Mich.....	5—2000 lb.	Brass and Bronze Castings and Aluminum Castings
Bridgeport Brass Company.....	Bridgeport, Conn.....	1—2000 lb.	Bronze Billets
Chase Metal Works.....	Waterbury, Conn.....	4—2000 lb.	Yellow Brass Billets
Cleveland Brass & Copper Rolling Mills	Cleveland, Ohio.....	1—2000 lb.	Yellow Brass Billets
Detroit Copper & Brass Rolling Mills	Detroit, Mich.....	4—2000 lb.	Yellow Brass Billets
Ford Motor Company.....	Highland Park, Mich....	1—2000 lb.	Brass and Bronze Castings
Ford & Son.....	Dearborn, Mich.....	1—2000 lb.	Brass and Grey Iron
Furukawa Mining Company.....	Tokio, Japan.....	1— 500 lb.	
General Aluminum & Brass Mfg. Co	Detroit, Mich.....	1—2000 lb.	Brass Castings
General American Tank Car Co...	East Chicago, Ind.....	1—1000 lb.	Brass Castings
Hall-Street Metal Rolling Co....	Birmingham, England...	1—2000 lb.	Copper and Brass Billets
Hills-McCanna Company.....	Chicago, Ill.....	1— 500 lb.	Brass Castings
Michigan Lubricator Company....	Detroit, Mich.....	2—2000 lb.	Brass Castings
Michigan Smelting & Refining Co.	Detroit, Mich.....	4—2000 lb.	Composition Ingot
Michigan Steel Casting Company.	Detroit, Mich.....	1—2000 lb.	Special Alloy Castings
Mueller Metal Company.....	Port Huron, Mich.....	1—2000 lb.	Yellow Brass Billets
Oregon Brass Works.....	Portland, Ore.....	1—2000 lb.	
		1—1000 lb.	Brass and Bronze Castings
Parish, Pool & Company.....	Cleveland, Ohio.....	3—2000 lb.	Composition Ingot
Pressed Metals Company.....	Marysville, Mich.....	2—2000 lb.	Bronze Castings
Rome Wire Works.....	Rome, N. Y.....	1—2000 lb.	Bronze and Copper Billets
Sherwood Brass Works.....	Detroit, Mich.....	3—2000 lb.	Brass and Bronze Castings
M. Smolensky Mfg. Company.....	Cleveland, Ohio.....	1— 500 lb.	Brass Castings
Wheeler Condenser & Eng. Co....	Carteret, N. J.....	1—2000 lb.	Yellow Brass Billets
White & Brother.....	Philadelphia, Pa.....	1—2000 lb.	Composition Ingot
	Total furnaces.....	46	

Ajax-Wyatt Furnace, Manufactured by the Ajax Metal Company, Philadelphia, Pa.

American Brass Company,	
Waterbury Branch	24
Kenosha	16
Bridgeport Brass Company	24
National Conduit & Cable Company	6
West Virginia Metal Products Company	6
Chase Rolling Mill Company	1
Washington Navy Yard	2
Buick Motor Company	1
General Electric Company	1
Raritan Copper Works	1
Ajax Metal Company	**3**
Baltimore Tube Company	2
Corbin Cabinet Lock Company	1
Rome Brass & Copper Company	1
	89

Rennerfelt Furnace Manufactured by Hamilton & Hansell, New York City

Titanium Alloy Mfg., Niagara Falls, N. Y.
1—800 lbs. 90 KVA furnace for aluminum bronze.

Gerline Brass Foundry Company, Kalamazoo, Mich.
1—800 lbs., 100 KVA furnace for bronze and brass.

Chicago Bearing Metal Company, Chicago, Ill.
2—1 ton, 300 KVA furnaces for bearing metal.

United States Mint, Philadelphia, Pa.
1—1 ton, 300 KVA furnace for coin metal.
1—1000 lb. 150 KVA furnace for coin metal.

United States Mint, San Francisco, Cal.
1000 lb., 125 KVA furnace for coin metal.

Baush Machine Tool Company, Springfield, Mass.
1—300 lb., 100 KVA furnace for aluminum.

British-America Nickel Corporation, Duquesne, Quebec. Canada.
1—1000 lb., 200 KVA furnace for nickel.

Aceiral Company of America, Newark, N. J.
1—300 producing aluminum alloy.

General Electric Furnace, Manufactured by the General Electric Company, Schenectady, N. Y.

McNab & Harlin Mfg. Company, New York,
1—1500 lb. per hour, making aterite.
1—2000 lb. per hour, making aterite.

United States Copper Products Company, Cleveland.
1—2000 lb. per hour, melting brass and copper.

Ohio Brass Company, Mansfield, Ohio.,
1—2000 lbs. per hour, melting brass.

United States Navy Yard, Washington, D. C.
1—2000 lbs. per hour, melting brass.

In addition we have received later reports of the installation of two Snyder furnaces of 2400 pound capacity, producing bearing metal, at the plant of the Chicago Bearing Metal Company, Chicago, Ill., and the installation of a Weeks furnace by the American Metallurgical Corporation, Philadelphia, Pa., at the plant of the York Hardware and Brass Company, York, Pa. Also that the Ajax Metal Company will install three Northrup furnaces in the United States Mint, Philadelphia Branch, for melting silver, and one 60 K. W. Northrup furnace for the Handy and Harman Company, New York City for similar use. The total number of electric furnaces in use and on order is, so far as we have been able to determine, over 217, almost all of which have been placed in the last few years.

Officers of the Institute of Metals, Division of the American Institute of Mining and Metallurgical Engineers.

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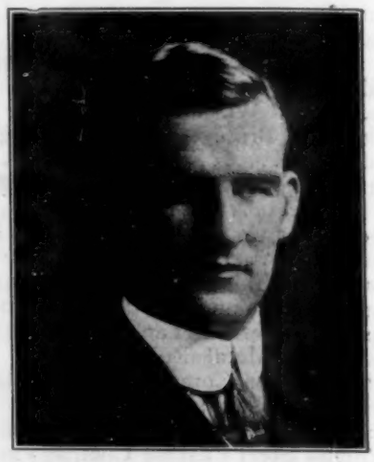

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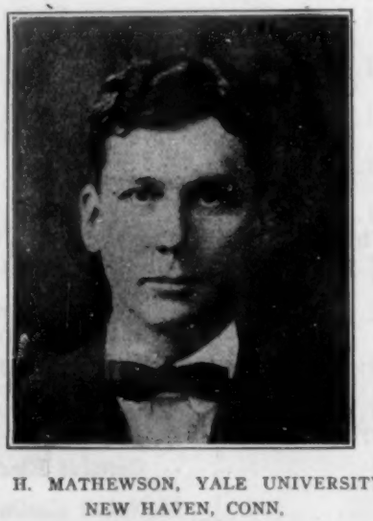

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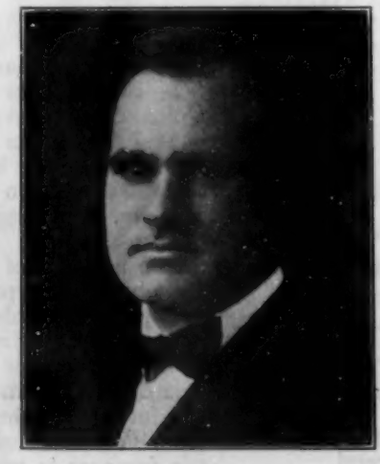

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NATIONAL MEETING OF INSTITUTE OF METALS DIVISION

AN ACCOUNT OF THE MEETING HELD ON FEBRUARY 17, 1920, IN NEW YORK.

The Institute of Metals Division held its winter meeting on Tuesday, February 17, in the building of the United Engineering Societies, New York City. New officers were elected and three papers were read. The new officers are as follows: Chairman, W. H. Bassett, American Brass Company, Waterbury, Conn.; secretary, W. M. Corse, Monel Metal Products Company, Bayonne, N. J.; executive committee, vice-chairmen, W. B. Price, Scovill Manufacturing Company, Waterbury, Conn.; H. J. Roast, James Robertson Company, Ltd., Montreal, Canada; Sir Robert Hadfield, Bart, F. R. S., D. Met., Sheffield, England; Dr. P. D. Merica, International Nickel Company, New York; F. L. Wolfe, Ohio Brass Company, Mansfield, Ohio; C. H. Mathewson, Yale University, New Haven, Conn.; Zay Jeffries, Aluminum Manufactures, Inc., Cleveland, O., W. F. Frank, Damascus Bronze Company, Pittsburgh, Pa. C. H. Bierbaum, Buffalo, N. Y.; P. E. McKinney, U. S. Naval Gun Factory, Washington, D. C.

P. E. M'KINNEY
NAVAL GUN FACTORY,
U. S. NAVY YARD, WASHINGTON, D. C.

Mr. Corse reported that the treasury of the Institute of Metals Division was in excellent condition. In addition to over $1,300 which it had, $250 was received from the American Foundrymen's Association as the customary return for its participation in the fall convention.

Mr. Freeman of the Bureau of Standards read two papers.

1. Intercrystalline Brittleness of Lead, by Henry S. Rawdon, Physicist, Bureau of Standards, Washington, D. C.

P. D. MERICA,
INTERNATIONAL NICKEL COMPANY,
NEW YORK CITY.

2. A Peculiar Type of Intercrystalline Brittleness of Copper, by Henry S. Rawdon, Physicist, Bureau of Standards, Washington D. C., and S. C. Langdon, Professor School of Chemistry, Northwestern University. A summary of these two papers and the discussion which followed them can be found on pages 69-70 of this issue of THE METAL INDUSTRY.

Frank S. Antisell read a paper on The Relationship of the Physical and Chemical Properties of Copper. This article and the discussion which followed can be found an pages 71-72 of this issue.

This meeting was very interesting, very well attended, and the discussions were quite spirited. Among those present were: G. H. Clamer, Ajax Metal Company, Philadelphia, Pa.; Dr. Joseph W. Richards, Lehigh University; W. R. Webster, Bridgeport Brass Company, Bridgeport, Conn.; A. R. Walker, Columbia University, New York City, and almost all of the newly-elected officers.

INTERCRYSTALLINE BRITTLENESS OF LEAD

SUMMARY OF A PAPER BY HENRY S. RAWDON, PHYSICIST, BUREAU OF STANDARDS, WASHINGTON, D. C.

1.—A type of deterioration of lead that renders the metal weak, brittle and capable of being crumbled easily into grains is described. The deterioration occurs as a result of corrosion during service, the attack of the metal is localized along the crystal boundaries and the brittleness produced is truly intercrystalline in its nature.

2.—Practically all of the commonly occurring impurities in lead are insoluble in the solid state and are to be found lodged between the grains of the lead. The intercrystalline brittleness is due largely to the behavior of these impurities when the metal is immersed in an electrolyte.

3.—Specimens of very pure lead were treated in the manner described by previous investigators for the production of the allotropic form of lead. No evidence was gained to justify the claim that lead may exist in an allotropic state analogous to the well-known gray tin.

4.—The forms of lead previously described in the scientific literature as allotropic states appear to be due to an intercrystalline attack by the electrolyte, immersion in which was necessary to bring about the allotropic change. The rate at which the so-called allotropic transformation occurs is largely a function of the purity of the lead and the acidity of the electrolyte in which the metal is immersed.

A PECULIAR TYPE OF INTERCRYSTALLINE BRITTLENESS OF COPPER

A SUMMARY OF A PAPER BY HENRY S. RAWDON, PHYSICIST, BUREAU OF STANDARDS, WASHINGTON, D. C., AND S. C. LANGDON, PROFESSOR, SCHOOL OF CHEMISTRY, NORTHWESTERN UNIVERSITY, CHICAGO, ILL.

The probable explanation of the embrittlement of copper when it is made the cathode in an electrolyte of sodium chloride, is that an appreciable amount of metallic sodium is formed by the electrolysis which is immediately alloyed with the copper.

The most striking feature is the selective attack by which the metal of the grain boundaries is acted upon and the action progresses inwardly between the crystals instead of forming an alloy layer upon the outside of uniform thickness. The behavior of one specimen when subjected to the bend test, illustrates the effect of a relatively thin brittle skin upon the properties of relatively larger piece. The structure

of the interior of the specimen shows no evidence of brittleness any more than does that of the rod used as an anode, or the rod in its initial state. It may be assumed, therefore, that only a relatively very thin skin has been rendered brittle by the electrolytic action; the properties of the entire rod have, however, been very profoundly changed.

DISCUSSION AT THE MEETING OF INSTITUTE OF METALS DIVISION, FEBRUARY 17, 1920.

Dr. Richards stated that he belived the explanations given in these papers to be perfectly sound. He mentioned, however, another phenomenon which had impressed him. When lead was used as a cathode in an alkaline electrolyte and with a high current density, the result was a very fine dusting of lead. This was produced by the formation of a lead-sodium alloy on the surface resulting in molecularly divided lead; in fact it looked like ink and took half a day to settle. He had used this type of lead to absorb the gold in sea-water. In this finely divided form it picked up the gold mechanically and after filtration could be assayed so that the amount of gold in one cubic centimeter of sea-water could be obtained. He had figured the cost of building and operating a plant for the reclamation of such gold, and had found that it would cost fully as much as the gold was worth, so there was no encouragement to go into the business. He also stated that he had found out through his own experiments that the pure metal was much less attackable than the eutectic.

Dr. Jeffries said that much work on the intercrystalline brittleness had been done in England, especially on brass, by Rosenhain, Archbutt, and Sir Robert Hadfield. It was found that seasonal cracking was due to these causes. Also that even pure lead would show intercrystalline brittleness after long exposure to moderate loads. The explanation was that in the amorphous phase the metal is viscous, and deforms slowly but steadily. In the crystalline phase it is not viscous and seems to deform hardly at all, but suddenly deforms very rapidly. He stated that most metals at high temperatures if loaded slowly would break at the grain boundaries.

Mr. Clamer mentioned that this point had a direct bearing on a problem which had been puzzling the railroads for years. They had found that the linings of bearings after some service gave indications of cracking, which had usually been attributed to impurities. They found, however, that not only lead, tin, and antimony, but also pure lead bearings cracked. This information threw new light on their problem.

Mr. F. A. Hall gave his experiences, which bore out Mr. Clamer. He had been working with 92 tin, 4 copper, 4 antimony lining for connecting rods for the Wright-Martin Aircraft Corporation during the war. They had done considerable work in investigating the cracks which occurred but on the basis of hunting for impurities, so that they had arrived at no trustworthy conclusions by the time the armistice was signed, and all further work stopped.

Mr. Corse asked Mr. Freeman to refer the practical problems mentioned to the Bureau of Standards, which Mr. Freeman replied that he would be very glad to do.

Dr. Richards then gave a short blackboard talk showing how this problem, intercrystalline brittleness, was affected by the general problem of corrosion.

He used figures 1 to 4 to explain his points. In Fig. 1, he showed two strips of metal, one pure, the other impure. The impure metal or the more attackable, immediately became an anode when connected by a wire to form a circuit. This was also true if the two strips were to touch each other, as shown in Fig. 2. This would continue to be true if the electrolyte were raised to a level above the height of the two metal strips, as in Fig. 3. The same condition existed in a

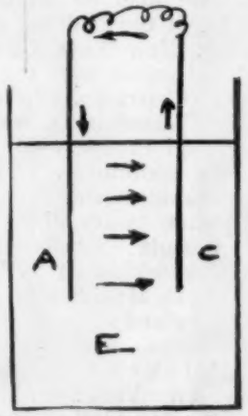


FIG. 1 A—ANODE, IMPURE
C—CATHODE, PURE
E—ELECTROLYTE

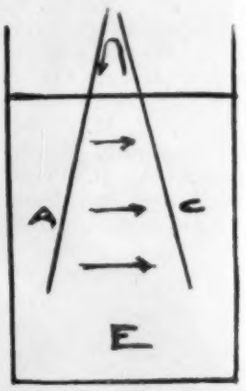


FIG. 2 A—ANODE, IMPURE
C—CATHODE, PURE
E—ELECTROLYTE

plate of impure metal, for example, lead. As shown in Fig. 4 a current exists between the crystal of pure lead and the matrix of impure metal such as the eutectic mixture. The pure lead acts as the cathode, matrix as the anode forming a local circuit and producing the conditions of intercrystalline brittleness explained by Mr. Rawdon. Dr. Richards stated as a general principle that wherever heterogeneity of structure existed this occurred. As experimental proof he suggested using a strip of pure lead and impure lead in a laboratory cell, as cathode and anode and measuring the potential.

Mr. Yensen spoke of the investigation by Pilling at the Westinghouse Research Laboratories, showing the brittleness in slightly oxidized copper due to the hydrogen which diffused through lead at high temperatures. He asked if there might not be some connection between this phenomenon and the brittleness occurring in Mr. Rawdon's experiment. Dr. Richards stated that copper and hydrogen form a eutectic giving the same conditions as shown in figures 1 to 4.

FIG. 3 A—ANODE, IMPURE
C—CATHODE, IMPURE
E—ELECTROLYTE

Mr. Antisell told of some work he had done in which he found that a potential existed between two pieces of similar metal, but of different size. He attributed the difference in potential to a difference in grain size. Dr. Richards replied that there were many other features to be taken into consideration besides merely the grain size. There was the fact that the large plate was in contact with more air than the small; that the small plate had been subjected to more work, was therefore, more corrodible than the large plate; that gas in the electrolyte would affect the

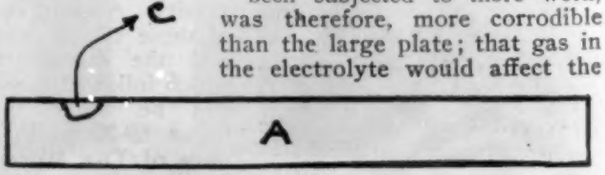


FIG. 4 A—ANODE, IMPURE METAL C—CATHODE, PURE METAL

situation. In addition no two pieces of metal, no matter how closely or similarly made, would be exactly alike.

RELATIONSHIP OF PHYSICAL AND CHEMICAL PROPERTIES OF COPPER

A Paper Presented at the Meeting of the Institute of Metal Division, in New York, February, 1920.

By Frank L. Antisell, Superintendent Raridan Copper Works, Perth Amboy, N. J.

Certain physical and chemical properties of copper are so intimately related that a change in variation of the physical properties indicates a certain chemical change. The standard specifications of copper of the American Society for Testing Materials are based upon physical characteristics with one exception, namely, the copper contents. The physical standard includes electrical properties, defects in the "set or casting," variation in dimensions, weight, etc. Paragraph 4 of the specifications states, "Wire bars, cakes, slabs and billets shall be substantially free from shrink holes, cold sets, pits, sloppy edges, concave tops, and similar defects in set or casting." Shrink holes and concave tops indicate both physical and metallurgical defects; cold sets, sloppy edges, etc., indicate physical defects only; small pit holes may be indicative or either or both physical and metallurgical defects, depending on conditions under which they originated.

To the refiner, a copper casting, no matter how made, is known as a "shape," irrespective of whether it is wire bar, ingot, cake, slab, billet, etc. As practically all shapes are cast in an open mold, that is a mold without cope, the surface of the shape cools in contact with the atmosphere and has a coating of oxide. Certain phenomena of the surface indicate the adaptability of the metal for forging or rolling. The writer believes that it is much simpler to produce shapes that are metallurgically correct than those that are mechanically satisfactory. When copper is to be rolled into thin sheets or drawn into very fine wire, the slightest physical defect becomes evident. It is, therefore, of the utmost importance to consider every characteristic of the shape and ascertain the physical and chemical relationship.

PITCH AND SET.

The appearance of the surface of the copper when cooled is considered as to its "pitch," or the general contour of the surface of the shape (which may vary from a concave to a convex); and the "set," or the detail appearance of the surface of the shape (the wave-like structure). When the shape presents a concave surface, it is known as "low pitch"; a convex surface is known as "high pitch" or "tough pitch;" and a level surface is called "flat pitch." The set of the copper is, in a very large measure, directly related to the pitch; and so intimately are these characteristics connected that they are often as synonymous terms used by the refiner when he is speaking of well-refined copper. If, however, he is speaking of unhealthy or improperly refined copper, he will define both the pitch and the set. The character of the set will show whether the copper is low pitch but healthy, or low pitch but unhealthy and must be refined again. High-pitch copper is usually described in terms of the set. If the set is very close and even, the copper contents are about 99.95 per cent; this close set cannot be produced on a shape or with a low pitch.

As the shape cools, there is a constant contraction with some degassing of the metal. As the top surface of the shape freezes, there is a tendency for the thin layer of copper to assume a finely corrugated surface at right angles to the longitudinal axis of the shapes; while the gassing of the metal tends toward the formation of a coarse wave-like structure. This structure varies, with the metallurgical properties of metal, between the extremes of a finely corrugated irregular surface, set or close grain, to a comparatively smooth surface in which the ridges are a considerable distance apart and the grain is coarse.

INFLUENCE OF OXYGEN ON COPPER

Metallurgically, the copper presents the best general characteristics when shapes of a certain size present a slightly convex contour, high pitch, with a good set and close grain. While a shape of a certain weight presents a satisfactory appearance, it does not follow that larger or smaller shapes will be the same. As a general rule, the thicker the shape, the less oxygen is permissible in it; the thinner the shape the more oxygen may be present. Oxygen is, therefore, often spoken of as a medicine for copper, it being used to regulate the pitch. While the pitch may be flat or slightly convex, it may be decidedly inferior if it presents a coarse grain.

Copper containing an excessive amount of oxygen that is introduced during the refining period is known as "set" or "dry copper." As the amount of oxygen decreases and approaches the analysis of satisfactory metal, it is known as underpoled; and when it is thoroughly refined, it is known as tough pitch. The fracture of tough copper must exhibit a decided metallic luster; a brick-red shade is indicative of undesirable oxygen contents.

With low oxygen contents, copper may be heated over a long period with the formation of a very slight coating of oxide, while with higher oxygen contents, the copper oxidizes quickly.

INFLUENCE OF SULFUR ON PHYSICAL PROPERTIES.

The general physical properties of copper change in a marked manner with the increase of sulfur. An increase in the sulfur contents affects the number of bends in a very much greater ratio than does oxygen.

UNHEALTHY COPPER.

Unhealthy copper contains slight quantities of gases, such as hydrogen, carbon monoxide, sulfur dioxide, and carbon dioxide. If an attempt is made to remove the excessive oxygen, the copper will spew; that is a miniature volcanic action will occur in the shape and the copper will be known as overpoled. Copper in this state will be low in electrical conductivity and have a small reduction in area, due to several reasons, particularly the excess of oxygen. These properties can be improved only by subjecting the entire charge to a refining process, which consists of oxidizing the copper, thus removing the reducing gases, and then poling the copper up to a tough pitch. Unhealthy copper may present either a high or low pitch, but if an attempt is made to raise the low pitch, the copper will spew.

REASONS FOR REJECTING COPPER

Reasons for rejecting refined copper on physical examination are: Low pitch; overpoling; cold sets; spewing; shot; fish (slivers of foreign copper, as the fins from the pouring ladle, etc.); holes of several characters, as water holes, shake holes, shrink holes, gas holes, spew holes, general porosity; foreign substances, such as charcoal, bone ash, dirt, etc.; splashes; fins; cracks; large set marks; water bursts; ridges on surface; shapes cast in rough molds; wrong dimensions; and collective defects. By the last term are meant two or more slightly developed defects, one of which would not be a sufficient cause for the rejection of the shape.

A definite individual hole in the set, or a "spot" as it is termed, is indicative of excess of oxygen; while the

series of small pit-like holes along the center of the shape is an indication of overpoled copper.

If the chemical analysis is standard and the pitch and set are good, there should be an examination for porosity, which is discovered just under the skin of the shape by cutting with a sharp chisel—the metal should show a dense surface and substantially be free from porosity—and the character and reason for the holes in the shape. If the holes were shaken in, the shape will not be satisfactory for drawing into fine wire or for rolling into very thin sheets. This defect is caused by the vibration of the mold allowing liquid copper to surge back and forth when it is cooling, resulting in slip bands when the shape contracts in cooling. This internal fracture between the grains of copper may be present even though there may not be any outward indications.

Copper, generally, is cast in molds that are carried by a machine under a ladle and it was deemed impossible at one time to move a mold of molten copper with sufficient smoothness to eliminate this washing of the metal in the mold and produce a perfectly sound casting. Prof. A. L. Walker has invented an apparatus with which shapes can be successfully poured. So important is this question of moving the molds of molten metal that casting machines have been introduced in the refineries that weigh as much as 300,000 lb. (Clark machine) in which the vibration is reduced to a minimum by a highly organized mechanical design.

ANALYSIS OF ELECTROLYTIC COPPER

Good electrolytic copper should analyze approximately as follows: copper, 99.950 per cent; silver, 0.0010 per cent; oxygen, 0.0390 per cent; sulphur, 0.0030 per cent; arsenic, 0.0015 per cent; antimony, 0.0020 per cent; nickel, 0.0015 per cent; iron, 0.0025 per cent; lead, nil; bismuth, nil; selenium, trace; tellurium, trace. The specifications of the American Society for Testing Materials permit a metallic contents of copper plus silver of 99.88 per cent. In every refinery, no matter how carefully conducted, an occasional furnace charge will not do better than to meet this analysis, the decrease being due generally to the combination of sulphur, oxygen, and iron.

ELECTRICAL CONDUCTIVITY

The electrical conductivity of copper is considered the most convenient method of determining its general properties. The conductivity varies in inverse ratio to its oxygen contents, and is directly proportional to the number of bends, a function of its reduction in area. The bends are determined on 12-gage wire by the Capp machine, a simple device that bends a wire at an angle of 90 degrees until it is broken. The general relationship of various physical properties of the oxygen contents are shown in Table 1. This table is based upon a series of tests in which the sulphur contents is about 0.002 per cent. The copper in the series *J* analyzes 99.97 per cent.

TABLE 1. GENERAL LAWS RELATING TO THE INFLUENCE OF OXYGEN ON PROPERTIES OF ANNEALED COPPER. DETERMINED ON NO. 12 SOFT WIRE.

	Oxygen Contents, Per Cent.	Tensile Strength, Pounds per Square Inch.	Elongation, Per Cent.	Conductivity, Per Cent.	Number of Bends.
A	0.200	37,340	28	98.25	21
B	0.175	37,300	29	98.60	22
C	0.150	37,050	30	98.83	23
D	0.125	36,850	31	99.20	24
E	0.100	36,600	32	99.55	25
F	0.075	36,300	34	99.80	27
G	0.050	36,000	35	100.30	30
H	0.025	35,200	36	100.60	33
J	0.015	34,000	37	100.80	35

LAWS GOVERNING TOUGH-PITCH PERIOD

A few general laws may be stated for the tough-pitch period, with reference to the relative properties of copper, which are applicable over a short range only.

1. As the tensile strength increases, the conductivity decreases.
2. As the oxygen contents increases, the tensile strength increases.
3. As the tensile strength increases the elongation decreases.
4. As the oxygen contents increases, the resistance of bending decreases.

ANNEALING COPPER

Proper care in the annealing of copper is often neglected, and it is seldom that the maximum elongation is realized, which is very necessary where the metal must stand a large amount of work in being fabricated. Extremely tough-pitch copper exhibits great ductility, and if it is given improper treatment in the mill it may tend to shred or tear the surface of the copper. These metallic shreds or slivers will not be entirely torn from the main body, but will adhere to it at one end.

When such a piece of copper is pickled, the shreds, not being oxide, do not dissolve in the solution, thus resulting in an imperfect surface. If the copper is not so tough, these slivers may be entirely detached or will not be formed at all, due to the thick veneer of scale. While copper may occasionally be preferred with such properties, it is at the expense of the physical characteristics of copper.

DISCUSSION AT THE MEETING OF INSTITUTE OF METALS DIVISION, FEBRUARY 17, 1920

Mr. Bassett, who was acting as chairman, spoke of the times when only the Welsh refiners knew how copper was refined. They were experts and they kept their secret to themselves. Now, however, the knowledge was much more widespread, but there was still too much inferior copper turned out.

Mr. Webster stated that in his opinion, the standards of copper manufacturers, within the last 25 years, had declined. He attributed it to the use of too large furnaces which perhaps made it impossible to refine as thoroughly and completely as had been done in the smaller.

Prof. Walker stated that physical defects were very much harder to remove than chemical. That although as Mr. Antisell had stated, a bending test was very valuable, it was trustworthy only when supplemented by a conductivity test, because only through the latter test could the ill effects of the presence of arsenic be discovered. He gave one example of an experience with physical troubles in wire bar copper. A large shipment of copper had been returned because of cracks. Upon investigation it was found that these cracks were in the same place in all of the bars and that the cracks were intercrystalline. Also, it was found that the cracks occurred in the place where the molten copper had entered the mold in pouring. It was finally decided that the copper at this point remained in a molten condition much longer than the copper in the rest of the mold. After the rest had solidified this portion could not pull itself together to allow the necessary contraction on cooling as the remainder of the bar was already solid, and therefore, cracked along the eutectic boundaries of the grains. The condition was finally remedied by pouring along the whole bar.

Mr. Webster stated that a part of their trouble was cracked bars and he hoped that Prof. Walker's method would remedy the condition.

ENGLISH GALVANIZING PRACTICE.

A General Description of the Methods and New Developments in England

By A. J. Franklin.

The process of covering iron articles with a coating of metallic zinc, in order to protect them from the action of the atmosphere, is said to have been discovered by Crawford in 1837, although the first patent seems to have been assigned to Messrs. Morewood and Rogers some few years later. The operation has become known as "galvanizing," but the name is not accurately applicable to the process as usually carried out, and the term "zincing" is now being introduced to describe the hot dipping process.

There are several methods of covering iron and steel articles with a coating of metallic zinc, the most important of which are:

(1) Zincing—immersion in bath of metallic zinc (hot galvanizing).
(2) Electro-galvanizing (cold).
(3) Dry galvanizing (Sherardizing).
(4) Metal spraying (Schoop process).

"ZINCING" (HOT GALVANIZING).

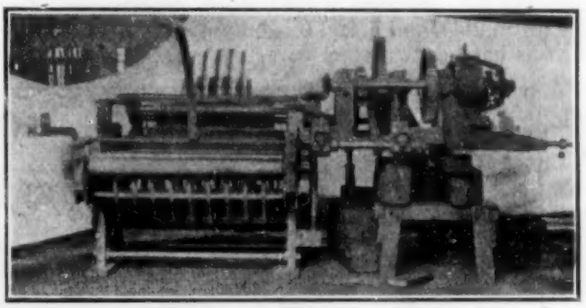
Although much may be written of the more modern methods of "galvanizing," the fact remains that the original hot dipping process is very extensively practiced in this country, notwithstanding its many obvious disadvantages. Smith, in his monograph on the Zinc Industry* states that practically all the 850,000 tons of galvanized sheets and wire exported from the United Kingdom in 1913 were made by this process, which has been much improved of late years by the introduction of suitable machinery to lead the metal in and out of the molten zinc (Fig. 1). Prior to the introduction of machinery the wire, sheets, and other articles, after having been pickled and cleaned, were simply dipped into the bath until such time as the operatives judged them to be sufficiently coated, and the excess of metal drained off. Naturally such crude methods brought the process into ill-repute, as the coating was not only irregular, but often covered with dross and dirt from the surface and bottom of the bath, which completely spoiled the appearance of the finished article. The zinc consumption, too, was at least as heavy again as it is in the method as now carried on in a modern plant, and with spelter in the region of £50 per ton, any outlay incurred in putting down machinery which will reduce the zinc consumption 50% is rapidly repaid.

THE IMPORTANCE OF PICKLING.

The first essential to success in the "zincing" process, whether carried out in a modern plant or by the old-fashioned dipping method, is to remove thoroughly all the scale from the iron—an operation known in the trade as "pickling." In British practice muriatic acid is generally used, although there are some works in the country where vitriol is employed, thus following the practice on the Continent. During the war "nitre cake" (acid sodium sulphate), a by-product in the manufacture of nitric acid, was employed owing to the embargo placed by the Government upon the use of other acids, but although galvanizers were able to carry on with this substitute, most of them were exceedingly glad to get back to the genuine article. No hard and fast rule can be laid down as to the best strength of pickle to be employed, as everything depends upon the nature of the work in hand. In the case of muriatic acid some favor a strong pickle made by adding one volume of acid to one volume of water, whereas others prefer a slower acting pickle of a more dilute character, say, one of acid to three volumes of water; with oil of vitriol it is usual to add one volume of acid to four or five volumes of water. The advantages of the British practice of using muriatic acid in preference to vitriol are chiefly as follows:

(*a*) Less expensive and lighter pickle vats required.
(*b*) Used cold, or nearly so, no steam being required for heating as with vitriol.
(*c*) Fumes are practically absent, and certainly less irritating to the workers.
(*d*) Quicker in action.

A carefully kept cost system on both methods has shown that there is nothing to be gained by the use of vitriol, for, although the latter is cheaper, a greater quantity is required and other items of expense incurred by its use outweigh any saving in the price of the acid.



THE "ZINCING" BATH.

After pickling, the work is either thoroughly swilled with water if vitriol has been used, or merely drained in the case of muriatic acid, and then passed on to the "zincing" bath. This consists of a heavy mild steel pot built up of plates welded, or in some cases riveted together. The bath is placed on a brick or sand foundation set in brick-work in such a manner that it can be uniformly heated on bottom and sides without danger of local overheating. In the States these baths are frequently gas-fired,* but in this country coke or coal is the favored fuel. Direct firing on the bottom of the bath cannot be employed owing to the settling of the dross (hard zinc) on the bottom by virtue of its higher specific gravity. In the more up-to-date works these baths are fitted with specially constructed thermometers or base-metal pyrometers to control the temperature of the molten zinc, as upon this depends the economical running of the bath. The best range of temperature for "zincing" is 445°C—465°C.; below 445°C. the action is slow and the deposit somewhat heavy, whereas above 465°C. the loss of zinc by oxidation rapidly increases, as does the amount of iron entering the bath. The tendency of the workman engaged on a piece-work basis is to over-heat the bath, and a careless or negligent crew may readily spoil a 25-30 ton bath in a month or so.

FLUXES USED.

The flux used is sal-ammoniac (ammonium chloride) and in some cases aluminum. The latter is added to the bath as an alloy of zinc and aluminum which melts about 460°C. Its use is becoming more common, as it no doubt renders the bath more fluid, and reduces the amount of zinc lost in the form of dross and ashes. It is also said to give a whiter and more uniform coating free from

*The Zinc Industry. (Longmans, 1918.)

discolorations. An excess of the aluminum alloy should not be used—just sufficient to clear the bath—and when galvanizing hard-drawn steel wire it should be avoided altogether, as only the purest brands of spelter can be used for this special work.

Some galvanizers use a very low grade spelter, but it is a short sighted policy; others add ½% tin to the bath to bring out the "moire-métallique" appearance which is so much desired. Table I. shows the chemical analysis of several brands of spelter used by galvanizers.

	Tin per cent.	Lead per cent.	Iron per cent.	Cadmium per cent.
1. British Spelter	nil	1.83	0.15	0.05
2. American Prime Western I.....	nil	2.40	0.09	0.25
3. American Prime Western II....	nil	1.32	0.08	0.10
4. Belgian Spelter	nil	2.05	0.19	nil
5. Unsuitable Brand	trace	3.12	0.53	0.27
6. High-Grade Spelter	nil	0.05	0.02	trace

Brands 1, 3 and 4 gave very satisfactory results.

Brand 2 was not so satisfactory, the high lead contents reducing the resistance of the coating to corrosion. Brand 5 is unsuitable, and brand 6 is only used for special work, such as hard-drawn steel wire.

of molten zinc by means of this machine. They then pass through a further pair of rolls, placed just above the surface of the metal, so as to remove any excess of zinc and at the same time thoroughly free the sheet from all adhering dross or dirt which may have been picked up in its passage through the bath. A typical machine, made by the United Engineering Foundry Co., is illustrated in Fig. 1.

In order to bring out the moire-métallique appearance on the sheets, they are carried along a conveyor for some distance before passing into the water-tanks, where any adhering sal-ammoniac, which has been used as a flux on the surface of the galvanizing bath, is washed away. This interval before boshing allows the zinc time to crystallize out and gives a brighter and more attractive finished product. Final drying, usually in sawdust, completes the process.

The principles outlined above underlie all hot galvanizing processes, although certain modifications are introduced when articles less easily handled have to be coated. Wire, chains, tubes, castings, etc., are all "galvanized" by this process, due regard, of course, being paid to the particular article in hand, and the procedure modified accordingly.

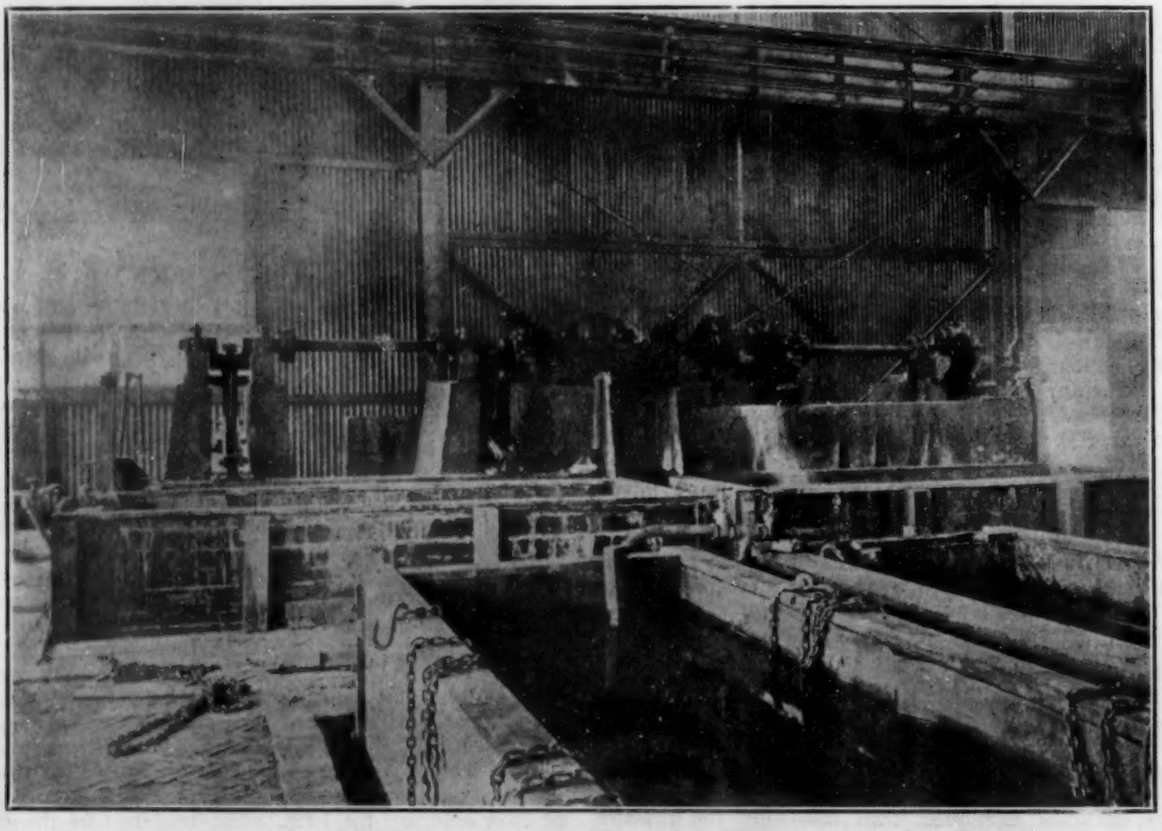


FIG. V. LAYOUT OF ZINCING BATH AND ARRANGEMENT FOR LEADING SHEET IN AND OUT

THE GALVANIZING MACHINE.

In the modern "zincing" process a galvanizing machine is employed. It consists of a series of gear-driven steel rollers, mounted in a suitable wrought-iron framework, and placed in the bath of molten zinc (Fig. 2). The iron sheets after leaving the pickle pass through india-rubber covered rolls, or revolving brush-mats, where the excess moisture is removed, and are then run through the bath

*Harris: "Surface Combustion as applied to Galvanising." (MET. AND CHEM. ENG., 1917.)

DISADVANTAGES OF THE ZINCING (HOT DIPPING) PROCESS.

The disadvantages of the process are obvious and numerous, even when carried out upon the most modern lines. Compared with electro-galvanizing they may be enumerated as under:

(1) Hot dipped articles do not resist corrosion so well as those properly electro-galvanized, as the coating is more irregular in thickness, less pure, and more porous.

(2) A coating, or layer consisting of an iron-zinc

compound* is formed between the iron of the zinc covering, and this has poorer mechanical properties than the iron.

(3) The coating on hot-dipped articles is nearly 50% less adherent than that obtained by electro-galvanizing.

(4) Greater control of thickness and more uniform nature of the deposit, also lower zinc consumption, in the case of gold-galvanizing.

(5) No fuel required, no waste, no troublesome residues to handle, no danger of burst pots, and less skilled labor required for electro-galvanizing.

(6) Serious liability of destruction of temper and warping of articles "zinced." This completely rules out the process for springs, gauges, tools, etc.

(7) Not suitable for screws or other threaded articles owing to clogging of the threads, neither for materials such as tubes, etc., which have to be bent after the process, owing to danger of peeling.

Under the heading of disadvantages should be placed the serious losses of zinc which have already been referred to. Turnbull, in a paper read before the West of Scotland Iron and Steel Institute in 1914, places the losses in the operation of "hot-galvanizing" iron wire at 32%, which he allocates as under:

18% dross (91% zinc).
12% ashes (66 to 68% zinc).
2% volatilization, etc.

Questions are frequently asked by galvanizers as to what the extent of their losses should be, and while these figures will give them a very fair estimate, everything, of course, must depend on the character of the work in hand, the nature of the firing, the class of spelter employed, and the ability of the workmen.

COLD ELECTRO-GALVANIZING.

The difficulties once encountered in attempting to electro-deposit a coating of zinc on iron have now been successfully overcome, and electro-galvanizing has become so thoroughly practical a proposition that it is a serious rival to other processes, especially in countries where electric power is cheap, and where large hot-dripping plants have not already been installed. The electrolyte is usually a neutral solution of zinc sulphate, or a caustic soda solution of zinc. On account of the high prices of fuel and spelter now ruling, together with the shortage of skilled labor, the electro-process will doubtless continue to make headway. It is slower and more costly than the "hot-dipping" process, but there can be no doubt as to the more uniform nature and greater purity of the zinc coating and its added power to resist corrosion. The strength and temper of the articles and the flatness in the case of thin sheets, are not affected in the slightest degree, while the adherence of the deposit has been fully proved. A great advantage of electro-galvanizing is that any faults present in the original articles are clearly seen after the zinc coating has been applied, whereas, as is well known, serious flaws are often hidden by the hot-dipping process only to show themselves when the article comes to be put into use. It is for this reason among others that the British Government Inspectors often specify cold galvanizing, especially for important components in naval work. For ordinary domestic articles, however, the hot-dipping process will probably continue to hold sway when it has given place to the cold process in other directions, owing to the fact that the electro finish is frosted and dull, and the moire-metallique appearance so much desired is conspicuous by its absence. The author understands, however, that there is one electro process which gives a bright finish, but he has had no practical experience of this.

It is not proposed to enter here into a detailed account of the cold electro-galvanizing process, since the ground has been very fully covered by previous writers in THE METAL INDUSTRY, notably an article by Pothoff, based on a paper read by Hogaboom at the American Electro-Platers' Congress, 1912, which deals with the various mechanical devices used in this process. The writer is an American, and this process, although placed on a commercial footing by an Englishman, has been more fully developed in the States than in this country for reasons which have already been outlined.

ESSENTIALS FOR SUCCESSFUL WORKING.

The chief essentials for successful working are briefly as follows:

(1) The articles should be thoroughly free from scale, and every trace of acid removed before placing them in the galvanizing tank.

(2) The electrolyte should be maintained at a temperature of 70-80° F., and since it offers great resistance to the passage of the electric current, the zinc anodes must be placed in close proximity to the articles to be coated.

(3) The electro process is not suitable for irregular shaped articles or for tubes of less internal diameter than 5 or 6 inches.

(4) A current of 3,000 to 4,000 amperes at 5 to 6 volts pressure is generally used, and with such a current the rate of deposition is about 1½ ozs. per square foot of surface per hour.

DRY GALVANIZING (SHERARDIZING).

This new process for covering iron articles with a coating of zinc, or certain other metals, appears destined to play an important part in the near future, for the process is economical, and gives a nice gray matte surface which is much admired. The articles are first thoroughly cleaned by sand-blasting in addition to the usual pickling process. They are then dipped in cyanide and packed in air-tight drums, which rotate intermittently, and which are partially filled with zinc dust from the condensers of zinc smelting furnaces. This dust should contain at least 50% metallic zinc and be in the form of an impalpable powder. It is a good practice to mix with it 2 to 3% charcoal dust so as to counteract any inlet of air due to an ill-fitting cover. When charged the drums are slowly raised to a temperature of 250° to 400° C., when the zinc dust vaporizes and condenses on the surface of the iron articles, forming a thin coating of zinc-iron alloy with a layer of pure zinc above.

ADVANTAGES OF SHERARDIZING.

Among the advantages claimed for this dry process are the following:

(1) Economical, yielding a superior finished article, and one capable of taking a high polish.

(2) Delicately hardened tools and springs can be sherardized without fear of loss of temper or danger of distorting.

(3) No fluxes are required; every part of the article is coated and the thickness of the coating is readily controlled.

A note of warning must be given as to the storage of zinc dust, since serious fires and explosions have resulted from improper and careless handling. If wetted or even exposed to moisture zinc dust is highly explosive in bulk.

METAL SPRAYING (SCHOOP PROCESS).*

In the latest modifications of the process the use of the oxy-hydrogen flame for melting the metal wire is

*Four definite compounds of zinc and iron are known, Fe_2Zn_3, Fe_2Zn_5, $FeZn_8$, and $FeZn_7$.

*Journ. Inst. Met., 1914, Vol. XII.

abandoned, and the metal is heated electrically either by alternating or direct current. This not only very materially reduces the cost of the process, but makes it very much simpler to operate. The power necessary is about one kilowatt at 30 to 40 volts pressure. An improved coating is obtained in this way, as there is no danger of sponginess or oxidation from the gas-blast.

It would scarcely appear that the Schoop process will take the place of general galvanizing, but it certainly has great possibilities for special work. It should be in the hands of skilled operators, as the exact conditions for success must be strictly adhered to or a porous, oxidized, non-adherent coating results. It is on this account that many experimenters have failed to get a good deposit and have condemned the process in consequence.

DEVELOPMENT OF CRACKS IN BRASS CASTINGS OF RECTANGULAR OUTLINE

AN EXPLANATION OF THE CRACKING OF CASTINGS IN SHARP CORNERS

WRITTEN FOR THE METAL INDUSTRY BY W. J. DALLISON, THE CENTRAL ENGINEERING COMPANY, LTD., MONTREAL, CANADA

Flat brass castings having a rectangular outline very often develop cracks, during cooling or soon after, at the corners of the casting. As a general rule these cracks follow a line bisecting the angle formed by the two sides of the casting. The reason of this fault is generally assigned to cooling strains, unequal shrinkage, etc.

While it is true that the strains set up in the material during cooling are largely responsible for this failure, the reason why the fracture of a casting of this nature invariably occurs at the corner is due to the peculiar formation of the metal crystals or crystalites at this point.

Metal crystals grow almost exclusively in the direction of certain axes, developing branched and elongated formations, and only in a few exceptional cases do they form anything approaching to a perfect crystal with regular faces similar to the regular crystals of salts crystallizing from their solutions. In those cases where the metal crystals commence to form faces, they appear to be interfered with in their devolpment by the formation of neighboring crystals, and do not attain to any perfect or symmetrical shape.

A metal cooling from its liquid state after casting commences to develop crystals from the points which have lost the most heat from radiation and other causes; these points are usually where the metal strikes the cold walls of the mold. The nucleus of a crystal thus formed continues to grow in an elongated shape towards the centre of the casting in a line perpendicular to the outside, being free to build up quite a considerable structure before meeting with interference from the later formation of crystals from the still molten metal of the interior. These later crystals, owing to the interference in their growth from the crystals just formed, are stunted in their development, and form more or less as "polygonal" grains. This double formation can be distinctly seen by reference to Fig. 1, which is a microphotograph of a small square bronze casting, magnified 9 diameters; Fig. 2 is the centre of the Bronze casting shown on Fig. 1 showing the "polygonal" grains magnified 80 diameters.

Now it will be seen that the elongated type of crystals, forming simultaneously along two adjacent sides of the casting, in a direction perpendicular to the cooling surface in the same plane will meet on a line bisecting the angle formed by these two sides. This can be seen clearly in Fig. 1, which shows the whole casting, and more clearly in Fig. 3 which is a corner of Fig. 1 magnified 80 diameters.

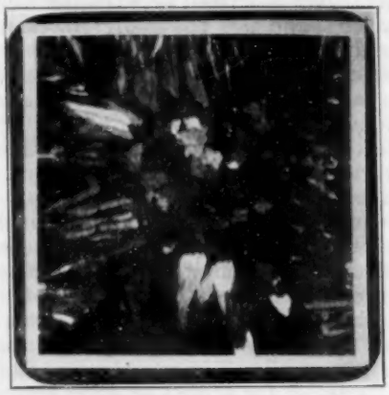


FIG. 1. SECTION OF SQUARE BRASS CASTING × 9

This line constitutes a source of weakness owing to the ease with which crystals forming on both sides of the casting can be seperated along this line.

FIG 2. CENTER OF FIG 1 × 80

When any strain is set up within the casting, such as that produced when the interior crystals commence to form and find their growth interfered with by the elongated type of crystals already formed, it will endeavor to equalize itself through the line of weakest resistance, which is the line formed by the meeting of the elongated crystals formed by each side of the casting, and a fracture or crack will invariably develop at this point.

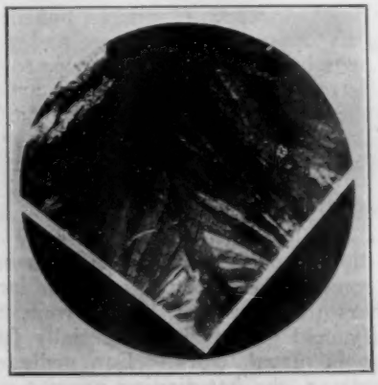


FIG. 3. CORNER OF FIG 1 × 80

This trouble can be overcome to a great extent by rounding off all corners and angles of patterns as much as possible, so that the elongated type of crystals can form in a continuous row around each corner and along the sides, and the strain caused by the crystallization of the interior will be equally distributed all over the casting.

GAUGES AND STANDARDS FOR MANUFACTURING BRASS GOODS

THE UNIFICATION AND SIMPLIFICATION OF ENGINEERING STANDARDS, IN TWO PARTS. PART 2. WRITTEN FOR THE METAL INDUSTRY BY PETER W. BLAIR, MECHANICAL EDITOR.

A large number of different wire gauges known by numbers have been in use. In order to avoid confusion it would be well if, in general, gauge numbers could be avoided and the size required given in decimals of an inch. However, when this cannot be done care should be taken to adhere to the gauge numbers which have become practically standard for all certain classes of wire. Upon the recommendation of the Bureau of Standards at Washington a number of the principal and leading wire manufacturers and consumers have agreed that it would be well to adopt and designate the American Steel and Wire Company's gauge, which is the same as the Washburn and Moen gauge, as the "steel wire gauge." In cases where it becomes necessary to distinguish this from the British Imperial Standard wire gauge it may be called the U. S. Steel Wire Gauge. This gauge applies to all steel wire.

For brass and copper wires and other metals the gauge universally recognized in the United States is the American Wire gauge which is also known as the Brown and Sharpe gauge. No confusion should arise between the Steel Wire Gauge and the American Wire Gauge because the fields covered by the two gauges are distinct and different.

The only wire gauge which has been recognized in Acts of Congress is the Birmingham or Steele's gauge. The Treasury Department has used this wire gauge for many years in connection with importations of wire, and the adoption of succeeding tariff acts with provisions for the assessment of duty according to gauge numbers gives legislative sanction to the gauge. The Treasury Department probably cannot conveniently discontinue the use of the Birmingham gauge at the present time. It should, however, be abandoned by all other users, since the gauge is very defective, and nearly obsolete, both in the United States and Great Britain, where it originated.

Twist drill gauges for small diameter drills and wire are a constant source of trouble to those who have to deal with drills and wire, and gauge number mean nothing unless the name of the gauge employed is specified.

Some drill manufacturers are discouraging the use of drill sizes and are asking that the size of drills ordered be denoted in decimals of an inch. See Fig. 1 illustrating new decimal gauge which has been adopted by the Amer-

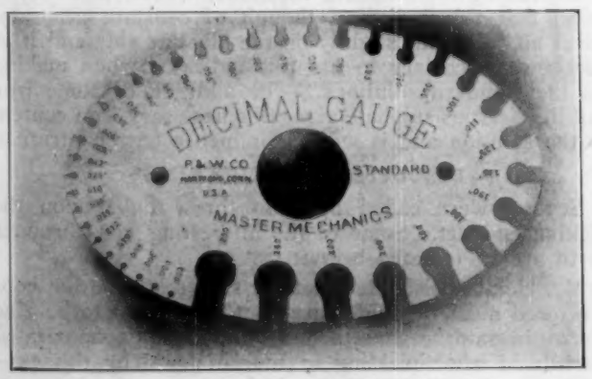


FIG 1. NEW STYLE DECIMAL GAUGE

ican Railway Master Mechanics Association of American Steel Manufacturers, under license of the American Society of Mechanical Engineers.

There are three well known standards for twist drills and wire, that are commonly used at the present time. These are the Stubs wire gauge used by the Standard Tool Company, and the gauge used by other leading manufacturers, such as the Morse Twist Drill & Machine Company, and the Brown & Sharpe Manufacturing Company. The latter has been termed the manufacturer's standard. The Stubs wire gauge is used for measuring steel wire and drill rod, but it is not used as much in this country at the present time as in the past. The gauge used by the Standard Tool Company was originally adopted for drill sizes in this country, but other manufacturers changed the numbers corresponding to certain sizes, while the Standard Tool Company retained the original numbers, but interpolated half-sizes in order to agree with the actual diameters of drills furnished by other manufacturers. The Standard Tool Company's gauge agrees with the manufacturer's standard for the sizes Nos. 1 to 60, inclusive, but does not agree with the Stubs Steel wire gauge. From Nos. 61 to No. 80 inclusive it agrees with the Stubs gauge, half sizes being omitted. It also agrees with "manufacturers' standard" as far as the diameters used are concerned, but the numbers corresponding to given diameters are different. The United States Standard Gauge for metals was adopted or legalized by Act of Congress, March 3, 1893, as a standard gauge to be used by the Custom House Depart-

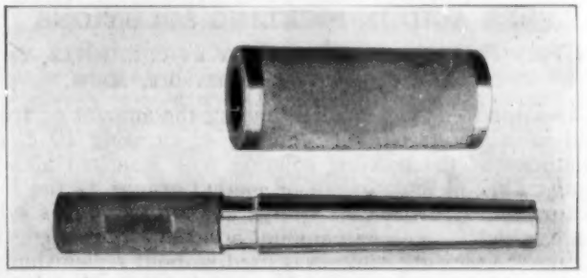


FIG. 2. MALE AND FEMALE GAUGES

ment for sheet metals. This gauge is also used by over fifty sheet metal manufacturers. Taper gauges male and female are employed on bored or reamed holes to find out if they are correct, as regards both depth and taper; see Fig. 2 for illustration. The cheapest method by which plug and ring gauges can be made is to use gauges in inserted machine steel handles. The best form adopted to plug gauges from 0.075 inch in diameter and upwards is to make the gauge with a taper shank, at the taper being one-half inch per foot. Gauges smaller than 0.75 inch in diameter should be made from straight hardened wire and inserted into the handle, which is then drilled to suit the diameter of the gauge. For these small sizes grinding of the plugs is unnecessary, as they can simply be lapped to size from a wire 0.001 inch larger in diameter than the finished gauge. When the blanks are made from bar steel, they should be at least 0.090 inch larger in diameter than the finished size, so that the decarbonized surface of the bar may be turned off and the uniform structure beneath reached. When gauges are made from drill rod only one half of this allowance is necessary. The plugs are turned to within 0.005 of the finished size, or 0.010.

The ring gauges on large sizes are inserted in circular holders, made from machine steel.

LIMIT MANUFACTURING SNAP GAUGES

In the previous article is illustrated a double end snap gauge. By comparing the designs of these gauges they can be adapted to similar work. The frames of these gauges illustrated in Fig. 3 are made from gray cast iron, reheated after molding to relieve all strains, and thoroughly season the iron, thereby eliminating all possibility of destroying accuracy of setting. They are reinforced by a double rib, also providing a secure grip. They are finished on the frames with a black enamel, which is baked on and gives them an attractive appearance and finish.

The measuring plugs are tool steel hardened and ground accurately to a tight friction fit in the frame. The gauge faces are lapped square with the axis insuring a perfect face bearing in all positions, corners bevelled to assist in guiding gauge squarely over the work. They are sealed on ends so that no tampering with setting or removing plugs from the frame without breaking the seal is possible. The locking device is completely housed within the measuring plug hole, the seal covering all parts.

The measuring plugs when worn can be reground on the face and lapped as adjustment is allowed for same, or new plugs can be inserted.

By the adoption and use of gauges in manufacturing brass goods for use on steam water and engineering specialties, repairs or parts can be furnished at all times as the standard dimensions can be maintained.

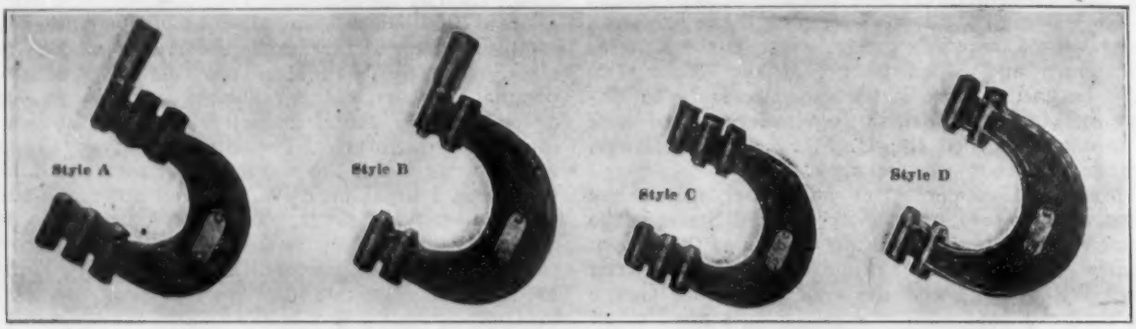


FIG. 3. LIMIT SNAP GAUGES

INDICATORS USED FOR DETERMINING FREE ACID IN PICKLING SOLUTIONS

WRITTEN FOR THE METAL INDUSTRY BY C. L. BOYLE, THE STUDEBAKER CORPORATION, DETROIT, MICH.

The usual method for determining the amount of free acid in pickling solutions consists of titrating 10 c. c. quantities of the pickling solution with standard alkali, using either phenolpthalein or methyl orange as the indicator. The presence of a large amount of ferrous sulphate, which increases in amount according to the length of time the pickling solution is used without replenishing, renders the end point with either methyl orange or phenolpthalein very hard to see. Of the two, methyl orange is to be preferred. There is, however, another indicator that can be used here that enables the operator or analyst to recognize the end point more asily. Either sodium or potassium thiocyanate (also known as sodium sulphocyanate) is the indicator referred to.

The use of either sodium or potassium thiocyanate is based on the fact that first, iron is always present in a pickling solution, and second, ferric thiocyanate is deep red color in acid solution, but loses this color the minute the solution becomes alkaline.

The following procedure is recommended:

First: Take a 10 cc. sample of the pickle liquor at a temperature of about 70° F.

Second: Add several drops of a concentrated solution of either sodium or potassium thiocyanate.

Third: Without diluting titrate the solution with standard alkaline until the red color of the ferric thiocyanate entirely fades, leaving the solution a greenish yellow.

Fourth: In connection with the titration, it may be pointed out that the coloration is more intense when the solution is used undiluted and that if it does not develop to start with, the addition of the alkali soon brings it out.

Fifth: The selection of what particular standard alkali should be made up depends upon whether the results of the titration wish to be expressed as percentage acidity by weight, percentage acidity by volume or pounds of anhydrous sulphuric acid per cu. ft. of pickling solution. A standard normal solution of caustic soda (Na.OH) will be found convenient for the expressing percentage by volume or by weight. In this case each c.c. of normal alkali represents approximately one per cent of free acid by volume. A .816 normal solution of Na.OH will be found convenient for expressing the results of the titration in pounds of sulphuric acid per cubic foot. Here the number of c.c. of standard alkali used to titrate 10 c.c. of pickling solution multiplied by (4) will represent the number of pounds of anhydrous sulphuric acid present in each cubic foot of the pickling solution.

For expressing percentage by weight, due consideration must be given to the weight of sample taken to titrate. This, together with the number of c.c. of a standard alkali gives all the necessary data from which the calculation may be made.

In making the standard solutions, it must be borne in mind that this indicator, though of constant accuracy, gives an end point slightly on the alkaline side and it is, therefore, necessary to use this indicator when making up the standard solutions. The addition of some iron salt like ferrous sulphate gives this necessary iron content to the solution and is without influence on the titration.

DISCUSSION OF PICKLING*

Several were called upon to throw light upon the pickling subject. Some of the interesting facts brought forth are enumerated below:

Mr. Deulbelbeis stated that for smooth steel a hot concentrated muriatic acid is used. On subjects to be zinc plated, he said he gave them a quick dip in concentrated nitric acid after pickling in muriatic and by this procedure he found the zinc could be thrown on the work much more effectively. For casting he uses hot muratic, concentrated, and adds one-half pound white arsenic per gallon. This enables him to plate copper direct on cast iron or drawn steel.

*St. Louis Branch A. E. S. From The Monthly Review.

THE STORY OF THE KNIFE AND FORK

THE DEVELOPMENT OF OUR TABLE INSTRUMENTS, TOLD IN TWO PARTS. PART 2. THE FORK.

WRITTEN FOR THE METAL INDUSTRY BY A. F. SAUNDERS, DESIGNER, THE BENEDICT MANUFACTURING COMPANY, EAST SYRACUSE, N. Y.

How few realize, as we use our silver fork at meal time, the centuries it has taken to develop this seemingly commonplace article of domestic use from the sharpened crotched stick of the savage to the beautifully proportioned piece of silverware that serves us so well under the name of fork.

It is difficult indeed to realize the fact that the general use of forks as an article of table use dates back not so very many years before the founding of our country; and that once upon a time the use of the fork was considered an effeminate and foppish custom. Humanity waited long for the fork, yet was slow to adopt the improvement after it had been introduced.

A sharp piece of flint or bone served our prehistoric ancestors as a cutting instrument, so also did a sea shell attached to a twig serve the purpose of a ladle or spoon. A forked implement however required no little skill to fashion, and as there was little in nature to suggest the idea, it is easy to understand why the fork is of more recent origin than either the knife or the spoon.

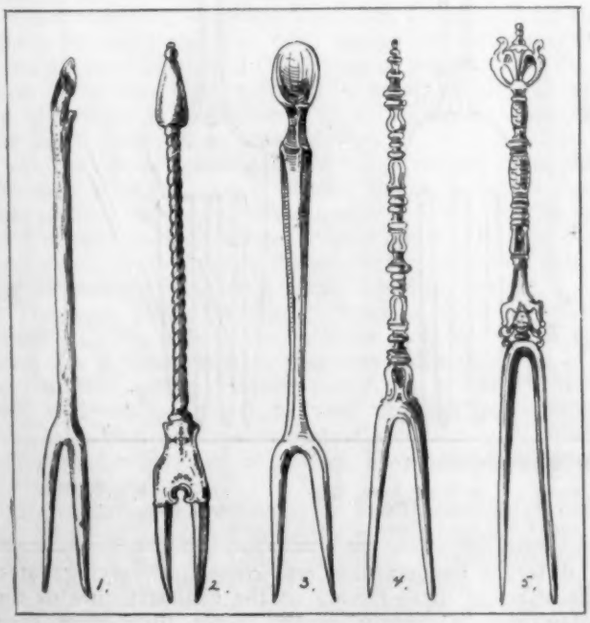


PLATE 3. FORKS OF ANCIENT TIMES.

1. Fork, Made from Crotched Stick, Prehistoric Age.
2. Bronze and Silver Fork, Pompeii, 1st Century.
3. Fork of Bone, Roman.
4. Silver Fork, Middle Ages.
5. Silver Fork, French Court Jester's Forkk, 15th Century.

The first fork was merely a crotched stick, the two prongs sharpened at the ends (Fig. 1, Plate 3). This was used in roasting meat over the fire, though perhaps more often a long pointed pole or stick, called by the Greeks an "obelus" was used for this purpose. What little we have been able to learn about the first metal forks leads us to believe that they were massive affairs made of bronze and used by the Egyptians for lifting sacrificial offerings from seething pots. The remains of such implements have been found in ancient Egyptian tombs. The Greeks and Romans used a five-prong sacrificial fork for roasting their meat over the fire, and several small forks of silver have been found in the ruins of Pompeii and Herculaneum dating back to the first century. But as to what these little implements were really used for we can only conjecture, as no representations of feasts previous to the fifteenth century show any utensil at the table that even resembles a fork, though it seems reasonable to suppose that some instrument of that kind must have been used in serving portions of meat.

An English writer of 1662 tells us that the table fork is descended from the same ancestor as the chopstick of the Chinese. Still another writer of old traces it back to Byzantine origin. Whatever its true origin, we do know that its use was not general, at least as an article of table service, until the latter part of the sixteenth century and that the Italians were the first to realize its practical possibilities. Thus the Italians first solved the problem of obtaining food from the common dish and not touching it with the hands. Unknowingly, perhaps, they had made a great advance in sanitation.

The common use of the fork was introduced into England from Italy early in the seventeenth century, and the biographer, Thomas Coryate, of Odcombe, was perhaps responsible for its adoption as an article of table use. In his book of travels, he makes mention of the peculiar customs of the people in the Italian cities and towns through which he passed, of using little forks when they cut their meat. He was so impressed with the custom that he adopted it for himself, and had a fork made which he always carried with him and used. This earned for him the epithet "furcifer" (fork-bearer), and brought considerable ridicule on him and others who later followed his example. It was not long, however, before the practical value of the fork as a table utensil was realized and we find both John Fletcher and Ben Jonson of Shakespeare's day commenting on the use of silver forks among the better classes of English society, and of iron forks among the lower classes. Our own Benjamin Franklin assures us that forks were not used on the tables of high society in France until the year 1600, but by the middle of the eighteenth century practically the entire people of the nation were using forks as a regular part of their table furnishings. By that time the type had advanced to practically our modern style of fork (Fig. 2, Plate 4) having four times and nearly the same proportions. Strange to say there are but two or three of these early type of four-pronged forks now in existence.

For centuries the two-pronged instrument, sometimes bedecked with jewels and richly inlaid decoration prevailed. The pieces dating from the sixteenth century exhibited several years ago as the Zschille collection of cutlery, demonstrate the fact that every metal has been used for knives and forks. Silver was the metal most used; in Italy it was generally decorated with rich niello work, or richly chased, embossed or engraved. Also enamel was often used, in combination with silver gilt. Such elaborate types were evidently made more for show than service, and gradually gave way to far simpler forms, as the fork came into more general use. The first steel forks of Sheffield, England, had only two prongs; then the three prong fork made its appearance; to the Louis XV period is credited the first four-prong forks, but the conveniently curved type so well adapted to the purpose for which we use our table fork is the product of

the nineteenth century. The past hundred years has seen the development of the fork from a clumsy heavy implement to the beautifully proportioned and practical piece of table silverware that graces the modern dining table.

One may say there is now a fork for every purpose. America has had a leading part in the development of not only the fork, but of all the articles coming under the general term of Flatware, Knives, Forks, and Spoons that make up the furnishings of the dining table. Her silverware industries lead the world in the manufacture of both flatware and holloware, not alone in production, but also in beauty and novelty of design, variety and style.

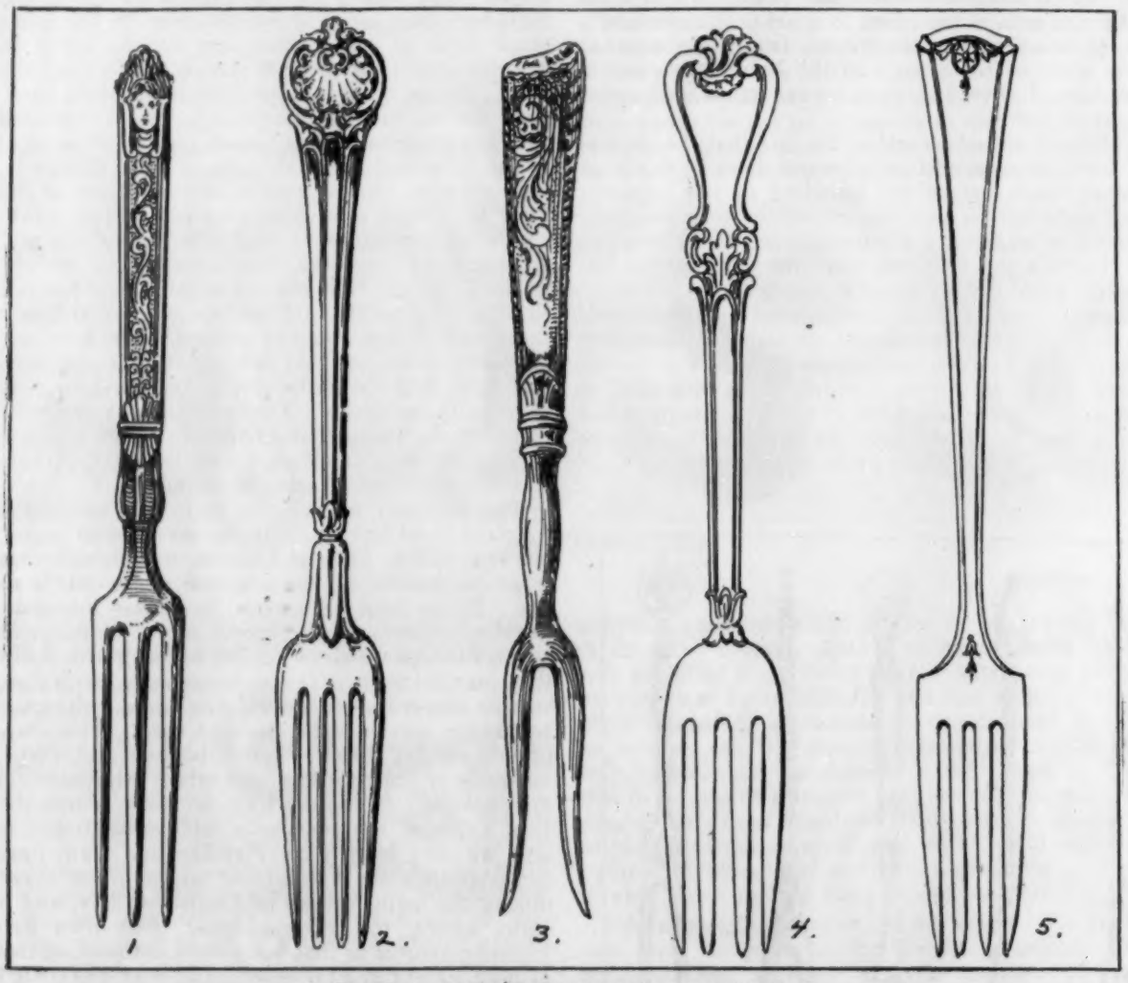


PLATE 4. TABLE FORKS OF MODERN TIMES.

1. Silver Fork, Italian, 17th Century. 2. Silver-Gilt Fork, Louis XV Period. 3. Silver Fork, American Colonial Period. 4. Silver Fork, English, 1870. 5. Silver Fork, American, 1920.

STANDARD METALLOGRAPHIC SPECIMENS

The importance of the microstructure of metals is well known and need not be expounded here.

The value of becoming familiar with the structures produced in metals by the addition of small or large proportions of other elements and with the effects of pouring temperatures and rates of cooling, is therefore evident. Where the relation of microstructure to physical properties should be emphasized to a purchaser, and where a definite structure is to be illustrated, or attained, a set of suitable standard specimens is almost essential.

Such a set of standards should contain specimens varying between the limits of composition met in production. They should be stamped to correspond with a sheet showing the composition of each specimen.

Specimens to be of a convenient size should be approximately one inch long by one half inch square. They should represent varying compositions and alloy proportions, and should be taken from heats of metal poured at different temperatures and cooled at varying rates. The effect of these factors on the final structure of the metal will be clearly evident after they have been polished and etched.

The specimens may now be filed in a convenient manner with a record of the composition and treatment given each specimen and may be referred to when a question of the results produced by following a certain procedure arises.

The construction of lighter bodies for airplanes, and similar problems of this nature, await the solutions which only the refined heat treatment of these alloys will bring to their aid.

This plan will greatly aid in bringing order to these previously rather haphazard conclusions, and will thereby promote progress along these lines of investigation and at the same time greatly aid a manufacturer in meeting metallographic specifications.—GILBERT E. DOAN, Engineering Experiment Station, U. S. Naval Academy, Annapolis, Md.

ELECTROPLATING IN SOUTH AMERICA

THE EXPERIENCES OF AN AMERICAN ELECTROPLATER IN SEVERAL SHOPS IN BUENOS AIRES

WRITTEN FOR THE METAL INDUSTRY BY HARRY GREENE

This is the letter which is mentioned in our correspondence columns in this issue. Mr. Greene is having most interesting and valuable experiences, and his observations are worth noting not only by electroplaters, but by manufacturers and supply houses.—Ed.

Out for a job, naturally, I was refused at some places as no help was wanted, but finally landed at one place which was in need of a "dorador," a gold plater. I was shown the plating room which was merely a small room in which were a few small tanks and enameled pots of about two gallons size. The enameled pots as he explained me were for such solutions to be used hot, and in this particular case for gold solutions. He also added that the reason for plating from an enameled pot was because it was so handy to heat as it could be easily put on the gas stove and heated. The price of gas is high here, since the price of coal is $36 gold, the gas being a product of the coal. Nearly all solutions are run cold, probably for that reason; to run a boiler for steam would also be a great expense. You can picture the difficulty of being deprived of such a necessary feature as steam heat, but still they have means of overcoming part of this obstacle.

Now returning to where I left off, I can say that the whole arrangement was odd, taking into account the dynamo, sand blast, and the drying of work in cold sawdust. The sand blast operated by hand, which will give an idea what a slow process it is, taking into account the large pieces to be sand blasted.

At the above mentioned place I arranged to appear the next morning, but it seemed to me that this place was not the one to suit my purpose as I was able to see all I wanted during the time I spent there. The shop was very small, but I accepted the job, at the same time thinking of locating a big shop which I had on my list.

The next place, Joselowich Bros. & Co., 2570 Sarmiento Street, looked to me more progressive. I applied for a job, which at first was refused, as no help was wanted, but on learning that I was a North American, their curiosity was aroused to learn how plating was done in the States, and after a conversation, learning of my experience in plating, I was hired to appear the next morning.

Now having two positions on hand I decided to take the latter as it seemed to be the more advanced factory, employing some 75 hands, engaged in manufacturing brass beds and articles such as sugar bowls, bread trays, serving trays, barbers' supplies, such as shaving cups, perfume sprayers, and many other articles used here in barber shops. Then again this factory makes store display fixtures made of brass and articles of special types too numerous to mention.

On time the next morning I was there ready for work. All the "Officiales" places occupied, that is, those doing the plating, I was put to do the scouring, but I did not object as it did not matter to me whether I was classed as an "Official" so everything went along smoothly, as it looked like the place I wanted.

I shall now give you a description of the factory, the plating department and the handling of the work. I regret very much to say that my scheme of taking snapshots of the different departments of the factory did not prove a success after a hard try to take some. The firm was considerate enough to permit me to take photographs of the factory, but on account of being dark inside and not having a suitable camera for the purpose, they were failures. I did take some, but the pictures did not show enough to give a fair idea, so I shall try to describe it on paper as best I can.

The factory occupies one and half stories running about 250 feet deep, and 75 feet wide inside, two-thirds of it being used for workshop and the other third for the buffing and plating departments. In the workshop I have noticed much of the work being done by hand, which to my judgment could be eliminated and performed in less time and better results by modern machinery, but as it is not in my line and being unable to describe my ideas thoroughly, I shall not go into details, but shall go on describing the buffing and plating ends.

In the buffing room there are employed 12 men, all occupied in different operations, such as surfacing, cutting down, buffing, coloring and glossing. The conveniences are far from modern; dirt, polishing material and dust fly all over. There is no such thing as suction to take up the waste from the wheels and polishing compound. It seems that the health of the operators is very little thought of, and then again the operators themselves do not seem to bother much. Well, I don't think they have ever seen things any better.

The plating room is divided in two sections with a wall between. One side is used for a pickling, acid dipping and cleaning room, while the other is where the plating tanks are installed. The former is an awful sight. In the first place there is no suction fan to take away the fumes from the acid, so they remain in the room until they find their way up to the skylight, which is located in the centre. Imagine the accommodations! None of the acid tanks are big enough for a quarter of the size of the pieces treated in them. In case the article is too large to be immersed, the acid is poured over it by means of an enameled dipper. Sure enough it is very difficult and the results are very poor in comparison with what they would be under modern improvements. Then again no tanks for rinsing are directly connected with the sewer, so that whatever is in excess runs over the top on the floor, until it finds its way into the spout located in the centre of the floor. The workers are constantly in the midst of it. The plater is subjected to the wet and acid floor and the bad acid fumes all day long.

Now as to the plating end of it there is more to tell, but first I will mention what solutions are used and capacity.

Nickel Solution, 500 gallons.
" " 100 gallons.
Brass Solution, 150 gallons.
Copper-Cyanide Solutions, 50 gallons.
Silver Solution, 200 gallons.
Gold Solution, 10 gallons.

In all the above baths, anodes are used with reference to the solution except the silver bath, in which platinum anodes are employed, drawing constantly from the bath, which is replenished when it is judged to be low in metal. The brass and copper are run cold. A silver strike is used before transfering to the plating bath, platinum anodes being used there also.

After they are finished in the buffing room the articles are brought into the plating department where they are flashed through a potash solution, because they believe that all the potash is for is to soften the grease.

The next operation is to remove the grease with the brush and pumice or lime. Every article from the small-

est to the largest is scoured. An electric cleaner would be a handy thing here. After a thorough scouring, spending much time and energy it is then plated. Not much pains are taken to obtain the brightest deposit possible, because it is figured that if the article is burned on the edges or blurry or stained or any such thing, the glosser will take care of same. The above is in reference to nickel, brass, copper plating or any other finish. Then again small articles are wired up for plating, which could easily be plated in modern barrels, increasing the output, and lowering the cost, but that is absolutely unknown here. I took the pains to explain to the foreman the advantage of an "electric cleaner," plating barrels and other means of producing better finish, increased production and much lower cost in the best Spanish I could, also by the aid of photographs of your journal THE METAL INDUSTRY, but I impressed him little as he could not see how the features could work as I stated. Only a practical demonstration could possibly obtain some good results, and, of course, of the above I had none at hand. It might have been easy enough to arrange a bath to remove the grease by the electric current, but here again I was at a stand still on account of the lack of heat and sufficient electricity, as the dynamos at hand could not produce the desired results. On account of not having means to demonstrate my ideas practically I could make no headway.

Now as to the labor question. That is far from equal to the States. The wages are low, when one considers that nearly everything necessary to life is about equal to that in the States. This has reference to the metal and plating trades, but I have heard that the same is true of other industries as well. The reason for this I may say is because the supply is greater than the demand. Foreman platers receive from five to seven pesos, paper money a day, which is less than half of the value of gold, while every commodity bought is priced equal to gold money. The above may be interesting to you as a matter of information, and I have purposely dwelt on it. Also I mean to bring out a more interesting feature, that is, why the manufacturers or job platers have not taken pains to search for modern equipment improvements. The labor is cheap and plentiful. It concerns them very little how long it may take to do a certain operation, and again how many operations can be eliminated, and still obtain the same results. Because of the cheapness of labor, the manufacturer is able to put his article on the market no matter what it may cost to produce and still be able to compete with foreign made goods of the specified articles.

All of the above is true of the present, but the times are changing gradually. The strikes which occurred here lately are a sure sign that the old system can not hold its ground very much longer, and by that I mean to say that sooner or later the proprietors will have to find ways and means to place their products on the market at the same cost as the foreign manufacturer, with his modern improvements and speed of production.

There is no doubt that the United States had made the most progress in the plating industry and automatic machinery for it. The science and machinery of the above can not only be very well utilized here, but it is badly needed. I am saying this because I am convinced that it is so.

Although everything in the manufacturing line may be in its infancy, yet it is necessary to look at the growth of Argentine. Only a matter of some years and you will find the Argentine Republic among the foremost nations. Because of this I believe that there are open channels for American chemicals, manufactures and modern improvement in plating. Speaking of chemicals reminds me of some American chemicals already here; those of the Mallinckrodt Chemical Works of St. Louis, Mo. Some manufacturers as you can see have already established trade here, and I say that there are plenty of opportunities for many others. The field is big and growing.

Now going back to where I left off in regard to my "job" at the Joselowich Bros. & Co. I stayed there 3 weeks. I would probably have stayed a little longer as I wanted to ask permission to take photos of the factory again, but the condition of always being in a puddle of water, as the floor was constantly, drove me away. However, during all the time I was there I made a study of everything possible. The working hours are very convenient, from 7.30-11.30 A. M. and from 1.30 to 5.30 P. M., having two hours for dinner, which is the usual custom everywhere. It is convenient in this respect, that no matter how far any one may live, he or she may enjoy a home meal and a little rest.

The next job was at Paulucci Bros., 1230 Corrientos St., also Buenos Aires. I am writing this letter while being employed there. In this place the conditions are about the same; in some respects better and in others worse. There is much to be improved, and rearranged, but here I find the same obstacle as I have already mentioned; a practical demonstration is the only convincing power to obtain the desired results, and on account of not having the means to accomplish it, I am merely looking things over. A great factor in the chemical line here would be sodium cyanide, on account of the high price of potassium cyanide, although much lower than in the States, and for that reason the brass, copper and other baths do not get all which is necessary to obtain a good bright deposit. I frequently found the anodes "green" for lack of cyanide. I explained to the owner one day that cyanide was necessary to add to the bath, because of the anodes being corroded and the high resistance in the bath did not allow sufficient current to flow through, and, of course, for that reason the work came out smutty and dull, which made it necessary to scratch brush afterwards. This could be easily avoided by just adding cyanide, but the answer I received was that cyanide was too high and could not be afforded. Of course it would be an expense to add potassium cyanide at the present prevailing prices yet cheaper than to employ extra scratch brushers. At the same time "sodium cyanide" is so much cheaper that in some cases, as it would be in this case, it would find itself received with open arms. I inquired whether any was for sale anywhere, but I was told that there was not; moreover they did not know of any such chemical as "sodium cyanide." I could mention a whole page or more of articles in the chemical line which are needed, but suffice it to say that such is the case. I just happened to mention "sodium cyanide," because I know what an important factor that is in plating.

The feeling of gratitude to THE METAL INDUSTRY for benefits I have derived prompted me to write this letter; also the fact that American chemical manufacturers, will become aware of the fact that there are opportunities for them in the South American republics. It must be borne in mind however that "new country, new customs," and they must be studied to achieve success. Experts in the line whatever it may be, and literature, in Spanish describing the use of articles are absolutely essential; of course, not overlooking the important fact that the expert must know the language thoroughly. Without the latter one is positively lost.

CORRECTION

In the contents of the January issue of THE METAL INDUSTRY, the article on a De-leading Pump should have been omitted. Taps for Brass appeared on page 10 instead of 12.

A NEW ALUMINUM WORKS IN SHAKESPEARE'S BIRTHPLACE

STRATFORD-ON-AVON THREATENED WITH IRRETRIEVABLE DESECRATION. MUCH ADO ABOUT ALUMINUM.

A number of people in England last year passed through a fairly long spasm of excitement about the terrible fate that was supposed to threaten Stratford-on-Avon. "The Mecca of the English-speaking peoples," it was said, was in danger of irretrievable desecration. To Shakespeare lovers all over the world a tale was told that was calculated to make their flesh creep. The town which owes its fame to its enshrinement of Shakespeare was warned to repent and retract. Otherwise there would be an end forever to the perennial stream of pilgrims, bringing their homage to the immortal memory and leaving in the town so much of their money.

The Town Council, unluckily meeting one day to the number of thirteen, had, given, by a majority of one, a decision which meant that upon Stratford as a place of pilgrimage had fallen the dread doom, "Ichabod!" Henceforth the only incense offered to the immortal bard in the town of his birth would be the smoke of factory chimneys and the mephitic fumes of blast furnaces. Arcadian charm would give place to sordid industrialism. Slag heaps would block the way to Shakespeare's birthplace and the gardens of the Memorial Theatre, now so green and trim, would become an abomination of desolation. Stratford, if it would not heed the warning, would in a very few years be another "Black Country"—nothing less.

Marie Corelli, the novelist, who for some years has lived at Stratford, where her chief sport has been dodging press photographers while basking in her canoe on the Avon, played the role of Cassandra with her usual zest.

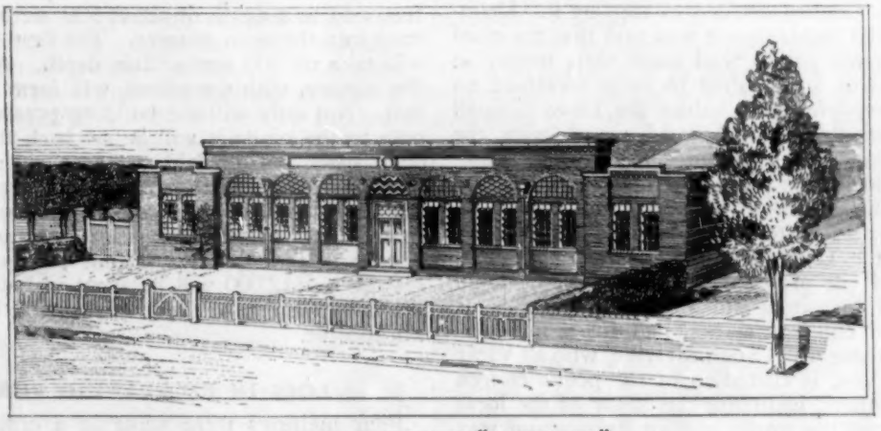
"If English folk are really proud of the great King of English Literature and would not make a poor show of their dignity in this regard before other nations, for the honor of their poet's birthplace and death-scene, surely a public protest should be made before the foolish people, bent on the spoiling of their town and heritage, ruin their possession irretrievably."

But it was one who signed himself "William Jaggard Captain" who, scenting the danger from his camp at Winchester, a hundred miles away, uttered the first cry of warning to the general public. Using the proudest privilege of an aggrieved Englishman, he wrote to the London papers "Calamity threatens immediately the fair and consecrated garden-heart of England." The Corporation, he said, had "resolved to sell forthwith a piece of land for the purpose of erecting blast furnaces and a smelting factory within half a mile of the greatest Englishman's birth-spot."

The mention of blast furnaces was enough. It was as the blast of a trumpet. Soon it seemed as if every man and woman who possessed or wished to be thought to possess literary judgment, artistic taste or a love of the English countryside had felt it imperative to join in the wild head hunt. Even a large section of the press itself, with similar heedlessness, took up the cry—for a time.

Some of the most solemn of English pundits allowed themselves to be stampeded out of their accustomed gravity. For instance, Edmund Gosse, the sanest of critics and the highest English authority on literature wrote, "The whole nation, certainly what part of it has a soul above the merest money-grubbing, are united to tell these Birmingham profiteers to hold their hand. Our little oases of tenderness and piety, our few shrines left undesecrated claim our passionate protection against the plague of business greed."

Little by little the plain truth of the matter became known. The Town Council had agreed to sell a piece of land belonging to The College Charity, of which they are trustees, to a Birmingham firm for the erection of what Miss Corelli called "an aluminum factory," really for a factory to produce aluminum hollow-ware. Judging by her inverted commas Miss Corelli thought that "aluminum factory" was the very last thing in the way of ugliness and malodorousness. She and her fellow Jeremiahs had to be taught that the manufacture of aluminum hollow-ware is a matter of manipulation and is one of the cleanest of trades, producing neither smuts nor smoke. "It is as absurd," write the promoters, "to suggest that we should make our own metal as it is to expect the grocer to grow his own tea or the blacksmith to have a steel smelting works in his back garden."



A FRONT VIEW OF THE "DESECRATION"

Desecration! The site is on the Birmingham Road, on the very border of the borough, and nearly a mile from Shakespeare's birthplace. Between it and the centre of the town, along the same road, are a brewery, a brickworks, a gasworks, an electric power station, a chemical works and two agricultural engineering shops with a foundry.

The Town Council, before agreeing to the sale, had received from the promoters an assurance that the factory would have no chimney, as the power used would be taken from the local gas or electric works; that no

advertisements, objectionable or otherwise, would be exhibited, that there would be no sulphurous or other fumes and no noise would reach the road to disturb the meditations of the pilgrims.

Some side issues raised by opposers of the scheme were as candidly met. Only ten of the allotment holders who had been using some of the land for their little gardens would be displaced and they would be fully compensated.

The firm proposed bringing over a number of their workpeople from Birmingham, but local workers would be trained and would ultimately be in the majority. Preference would be given to discharged service men as in the firm's Birmingham factories, where 75 per cent of the male workers are discharged soldiers and sailors. Stratford needed a remedy for unemployment, but the promoters were not coming to exploit cheap labor, for, as in the Birmingham factories, trade union wages would be paid. As for the Birmingham workers who were to be transplanted it was asked, "Are they not as much entitled to live in healthy and desirable surroundings at least as much as is the complaining knight who told your Council that he left Birmingham every evening for that identical reason?"

But the controversy went on. Local opinion wavered again and again under the shock tactics of the opposition but gradually veered towards acceptance of the scheme. The Trade Union Council decided to support it. Deputations of influential residents—it was said that the chief opposition came from people who made their money in manufacturing towns and wished to keep Stratford an aristocratic preserve—failed to induce the Town Council to rescind its vote. The final word rested with the Charity Commissioners in London, without whose sanction the land could not be sold. They were assailed by the opposition with memorials and resolutions.

The strange eventful history ended with a local inquiry held by one of the Commissioners. Among the witnesses in favor of the proposal were townspeople who, misled by Captain Jaggard's and Marie Corelli's talk of blast furnaces and chimney stacks, had for a time opposed it. One of these was Canon Melville, who as Vicar of Stratford-on-Avon, is custodian of the poet's church and tomb. Like others, including the editor of the local paper, he had visited the works in Birmingham and was satisfied that "there was no offence in't." The Chairman of the Corporation Estates Committee, who is also a trustee of Shakespeare's Birthplace declared that he would not have recommended the sale if he had not been satisfied that it would not be detrimental to the interests or amenities of the town or to the adjoining owners. The site was described as lying quite outside the pilgrim zone.

In order to give the opposition an opportunity to deploy, the Commissioner re-opened the inquiry a week later. The Mayor, who so far had favored the scheme, now declared that he had been convinced that it would be detrimental. He spoke of an influx of industrial workers causing overcrowding, and probably the erection of rows of ugly houses. He feared the loss of the quietness, smallness, cleanliness and general beauty of the town and its surroundings, which, in his opinion, attracted visitors as much as did the Shakespearean atmosphere.

But he did not go so far as one of his townsmen, who said he understood that metal workers were among the lowest types of manual workers.

No fewer than three knights entered the lists are witnesses for the opposition, Sir Sidney Lee, the biographer of Shakespeare, Sir Whitworth Wallis, the Keeper of the Birmingham Museum and Art Gallery, and Sir Henry Lunn, who gained fame before the war as an organizer of international tours. Sir Henry Lunn, after a fervid discourse on the "Mecca" theme, had to confess that till he was asked to join the Committee of Protest he had never visited Stratford.

"Then," said one who was present, "the bottom fell out of the opposition. You could hear it drop." A day or two afterwards the Charity Commissioners sanctioned the sale.

The factory is now being built, and will be opened in March. Its owners are the firm of N. C. Joseph, who have two factories in Birmingham. One of these was erected during the war for aeroplanes and other Government work but is now fully occupied with aluminum hollow-ware manufacture. It adjoins one of the Corporation Schools of Art and its frontage, to say the least, is not incongruous with that of its neighbor. Since the war the British aluminum hollow-ware trade, which started in Birmingham, has been advancing by leaps and bounds, and the Joseph firm is one of the most go-ahead. Although up to the end of the war its business in both factories was purely engineering and the turnover from war work took some time to make, the firm has within twelve months turned out domestic utensils to the number of a million and a half. It is developing a good export trade, and has just been asked to quote prices for its wares for sale in the United States. One of its latest advances has been the making of cast ware in steel dies instead of in sand.

The site of the Stratford factory has a breadth of 300 feet, and to a depth of about 900 feet stretches from the road into the open country. The first shop to be erected will take up 300 feet of this depth. At the nearer end, the factory, with the offices, will form a frontage of 120 feet. Not only will the building present its narrow side only to the road; it will be set back thirty feet and the open space will be laid out as a shrubbery or garden, whilst the whole of the site will be surrounded by hedgerows and trees. The price paid for the land, £1,573, will enable the corporation, by its investment, to add £56 a year to the previous income of the Charity. From £10,000 to £12,000 will be spent in building the factory, which by the end of the first year will be employing 500 workpeople.

LOSS IN RE-MELTING PURE ZINC

Four meltings were made in a crucible furnace, the first two charges consisting of 20 per cent and 50 per cent respectively, of very good zinc turnings, the remainder in each case being made up of zinc scrap and new sheet zinc in equal proportions. The other two charges were solely of turnings, the only difference between them being the quality. The results are given in the following table:—

	1		2.	3.	4.
Crucible.	Graphite.		Iron.		
Charge:—	50 kg. turnings	125 kg.	turnings..	224 kg.	338 kg.
	100 " scrap	62 "	scrap....	turnings	turnings
	100 " sheet zinc	63 "	sheet zinc.		
	250 kg.	250 kg.			
Containing turnings....	20% very good		50% v.g.	100% v.g.	100% medium.
Yield: Ingots.....	223 kg.	219 kg.		192. kg.	248 kg.
Dross*	14.5 kg.	19 "		47 "	87 "
Total yield including Zn recovered from dross.	225.6 kg	224.4 kg.		200.5 kg.	248 kg.
Yield in % of charge..	90.25%	89.0%		82.1%	73.5%
Loss in melting.....	9.75%	11.0%		17.9%	26.5%

* The dross from Nos.1-3 contained 18 per cent. of recoverable metallic tin.

The average loss in re-melting pure zinc in the crucible furnace with 20-100 per cent of turnings was, therefore, 16.3 per cent of the charge.—*Metall und Erz.*

For pickling, one plater uses five gallons muriatic to 25 gallons water and by keeping at 120 degrees pickles his work in five minutes.

THE YEAR'S PROGRESS IN METALS

A Review of the Most Important Work Conducted in the United States and England on Metals and Alloys, Continued from the January Issue.

Written for The Metal Industry by One of Our Staff.

FIVE FOUNDRY TESTS OF ZINC-BRONZE.

In conducting comparative tests of alloys of the government bronze type, great care must be taken to keep uniform all conditions affecting the quality of the finished castings, such as composition of charge, pouring temperature, shape and size of test bars, kind of mold used, method of pouring and gating, etc.

With rather carefully standardized methods of making test bars of this type of alloy, considerable variation in physical properties of test specimens from the same foundry are to be expected and greater variation in those from different foundries.

Average values are given of the two typical alloys investigated, viz., 88 Cu, 10 Sn, 2 Zn. and 88 Cu, 8 Sn, 4 Zn. C. P. Karr, in Bulletin No. 153, American Institute Mining and Metallurgical Engineers, September, 1919, pp. 2485-2492.

PHYSICAL PROPERTIES OF CERTAIN LEAD-ZINC BRONZES.

Of nine variations in composition of lead-zinc casting bronzes containing 90% copper studied, the most satisfactory was lead-zinc bronze A containing 90 copper, 6.5 tin, 0.5 lead, 3 Zinc. This composition showed a proportional limit of 12,200 ± 650 lb. per sq. in., tensile strength 40,700 lbs. per sq. in elongation in 2 in. of 37.6 ± 6.4% and reduction in area of 34.1 ± 4.5%.

Substitution of lead, above 1/2% for zinc or tin and of zinc above 2% for tin was found to have detrimental effects on the physical properties of the castings.

A pouring temperature of 1100°C. (appproximately 2000°F) was found satisfactory for these lead-zinc bronzes.

Heat treatment had but slight detrimental effect on these bronzes.

The results obtained have justified the prediction of the qualities of the alloys by a priori reasoning based on the copper-tin equilibrium diagram. Homer F. Staley and C. P. Karr, in Bulletin No. 153, American Institute Mining and Metallurgical Engineers, September, 1919, pp. 2513-2522.

MANGANESE BRONZE.

The results obtained after about three years of operation under the process described have shown rather conclusively that the alloy commonly known as manganese bronze can be produced without resorting to the use of high-grade virgin materials with the addition of what would ordinarily be termed detrimental impurities, by the simple application of some of the well-known laws of metallurgy. P. E. McKinney, Bulletin No. 146, American Institute of Mining Engineers, Feb. 1919 p. 421.

TIN FUSIBLE BOILER-PLUG MANUFACTURE AND TESTING.

The results of the investigation indicate that the pig tin should be at least 99.7% pure, containing not more than 0.1% lead, or 0.1% zinc, which are the requirements of the Steamboat Inspection Service.

The casing should be of bronze, an alloy the major constituents of which are copper and tin. Small amounts of zinc and lead increase the ease of casting and machining and are not objectionable if not present in greater amounts than the following compositions: 88 Cu. 10 Sn. 2 Zn., or 87 Cu., 7 Sn., 5 Pb. 1.

The pot or crucible for melting the tin should not be used for melting other metals, this doing away with the liability of contaminating the good tin when these are not thoroughly cleansed.

Casings should be tinned on the inside with the same grade tin as is used for filling, but the tin left over from this process should not be added to the filling used. Zinc chloride flux may be used although hydrochloric acid is preferred, though no flux need be used during the filling process.

The casing should be preheated to not above 250°-275°C. (482°-527°F.) and tin should be poured at a temperature not above 275°-300°C. (527°-572°F.)

DETERIORATION OF NICKEL SPARK-PLUG TERMINALS IN SERVICE.

This investigation concerned the service deterioration of nickel spark-plug terminals, which was shown to be due to the embrittlement of the wire by the formation of a system of intercrystalline network and definite transverse cracks.

Variations in chemical compositions of the nickel wires do not appear to have much bearing on the deterioration. It occurs in wire of relatively high purity as well as in the "97% grade" usually specified.

Continual heating of nickel wire in the air at a high temperature contributes slightly to the embrittlement of the wire by the formation of an intercrystalline eutectic-like oxide network.

Nickel wires heated in a strongly reducing atmosphere show evidence of an intercrystalline embrittlement of the surface metal. A thin brittle surface skin, apparently carbide, forms in case considerable carbon is deposited on the wire.

Intense local heating by means of the electric spark together with the sudden cooling contributes to the embrittling of the wire by the formation of fine intercrystalline fissures in the heated zones.

The application of a relatively low stress to the hot wires is sufficient to fracture the wire by the formation of transverse intercrystalline cracks. The tensional stress due to the differential expansion of the shell and the terminals is probably sufficient to cause the formation of the transverse breaks in those electrodes that are firmly anchored at both ends. Such cracks were not found in other forms of nickel terminals. Henry S. Rawdon and A. I. Krynitzky in Bulletin No. 152. Aug., 1919, of American Institute of Mining and Metallurgical Engineers, pp. 1322-1350.

SOME PROPERTIES AND APPLICATIONS OF ROLLED ZINC STRIP AND DRAWN ZINC ROD.

In this paper the following topics are discussed in the order indicated.

1. Rolled zinc as described in the existing literature.
2. The properties and behavior of zinc from a theoretical point of view.
3. The effect of the ordinary rolling variables compared with copper and the copper brass alloys. Factors controlling the "temper" of rolled zinc.
4. Static properties of soft, medium and hard strip zinc before and after annealing.
5. Dynamic ductilities.
6. Stiffness of worked zinc; alloyed products.
7. Successful applications.

C. H. Mathewson, C. S. Trewin and W. H. Finkeldey, in Bulletin No. 153, American Institute of Mining and Metallurgical Engineers, Sept., 1919, pp. 2775-2846.

ELECTROLYTIC ZINC.

This paper discusses roasting ferruginous zinc-sulphide ores; experimental electric roasting furnace; sources and nature of ores tested; gives results of experimental roasting in electrically heated roaster; an account of roasting in a hand rabbled reverberatory furnace; roasting in Wedge furnace; discussion of roasting data. C. A. Hansen in Bulletin No. 152 of American Institute of Mining and Metallurgical Engineers, August, 1919, pp. 1247-1281.

AUTOMATIC COPPER PLATING.

At the works of the Metals Plating Company, Elizabeth, N. J., iron sheets are plated with copper by a new process. The plating metal is applied to the sheet in the form of a liquid mixture by means of rolls, such as inking rolls. The sheet after being coated with the mixture, is automatically carried forward and deposited on a link-belt conveyor, which carries it through a furnace maintained at a temperature well above that of molten copper. The basic principle involved in this method lies in the application of the plating metal to the sheet while the sheet is cold and then melting the metal in place on the sheet under conditions which are favorable to the formation of the plating. J. W. Richards, Bulletin of American Institute of Mining and Metallurgical Engineers, Jan., 1919, p. 27.

MICROSTRUCTURE OF IRON DEPOSITED BY ELECTRIC ARC WELDING.

A method of etching is described which has been found useful in bringing out the grain boundaries of chrome-nickel and chrome-vanadium steels hardened and tempered to a Brinell hardness around 300. This method consists in etching the specimen in a 4% solution of picric acid in ethyl alcohol for a period ranging from 5 to 25 minutes, and then rubbing off the carbonaceous smudge on moist broad-cloth or kersey. George F. Comstock, Bulletin American Institute of Mining and Metallurgical Engineers, Jan., 1919, p. 43.

SOME TESTS OF LIGHT ALUMINUM CASTING ALLOYS. THE EFFECT OF HEAT TREATMENT.

The tensile properties and the hardness of a number of different compositions of light aluminum casting alloys have been determined, as well as the behavior under the action of alternation and repeated stresses.

The results of the tests have shown that it is possible to obtain with several compositions a casting which will have a reasonable amount of ductility together with strength as great or greater than that of the present light casting alloys in commercial use, and it is believed that there should be a real demand for an alloy of this type.

The effect of heat treatment on the mechanical properties of copper-aluminum and copper-magnesium alloys is markedly to increase the tensile strength and hardness; with this is associated an irregular change in ductility, sometimes a decrease, sometimes an increase. The heat treatment of light aluminum alloy castings of such compositions seem to offer interesting commercial possibilities.

There seems to be no marked difference in the resistance of different compositions to the action of repeated stress; each of three compositions which were investigated withstood 10,000,000 complete reversals at a maximum fiber stress of 7,000 lbs. per sq. in.

The microstructure of the alloys was studied and correlated with the mechanical properties and type of fracture. From the Technologic Paper, Bureau of Standards, No. 139, P. D. Merica and C. P. Karr.

PRODUCING UNIFORM RESULTS.*

By F. C. Mesle.

One of the essential requirements of the successful electroplater is that he shall be able to turn out uniformly good work every day of the year. To do this it is necessary to maintain every factor that enters into the plating process in constantly uniform condition. "The same cause will always produce the same effect." A solution that will turn out good work today will do good work every day, if we can keep all factors the same. To keep all conditions the same a chemist, or a knowledge of chemistry, is needed by the plater, as a qualitive analysis of the solution must be made frequently to insure uniform condition of the solutions. The hydrometer or specific gravity test is of little or no value in testing a plating solution as it does not indicate what materials are lacking or what are in abundance. Neither can the current density be measured by the voltmeter, an ammeter should be used.

It is unwise to wait until the bath begins to work poorly before making an analysis of it. Prevention rather than cure is the principle that should be operative in the plating art. Keeping the solution in a healthy condition is much better than letting them get out of order and then doctoring them up, and in the mean time turn out several lots of inferior work.

In silver plating the factors that need to be kept constant are:

Ounces of silver per gallon;
Ounces of free cyanide per gallon;
Ounces of carbonate per gallon;
Bright solution per gallon;
Temperature of solution;
Amperes per square foot of cathode surface (current density).

To know the condition of a solution a chemical analysis must be made and the needed additions then made as analysis indicate. A convenient and useful method of recording the analysis is illustrated by sketch of card for this purpose. On this card is recorded the weekly analysis of all the important factors of a silver plating solution for four months. The only important thing to note is that no chart lines went outside of "safety zone," hence were kept in good condition during the time covered by the record. If the chart lines go outside of the safety zone the operator is instructed not to use that solution until the correction has been made.

This same method can be applied to a nickel solution or to any plating, cleaning or pickling solution.

A small volume of solution through which large amounts of work are passed, such as a cleaning solution, should be corrected every few hours, others daily, and others weekly. This, of course depends upon how fast experience indicates sufficient change takes place in the solution to require correction. Remember, it pays to keep the solutions healthy.

PICKLING.

One plater states that for scaled steel he uses one part sulphuric and ten parts water cold. For extremely rusty work he uses one part muriatic and one part water at 100 degrees. He then runs it through a bath of hydrated lime.

Another points out that where sulphuric acid was used in pickling, lime should not be used to neutralize since calcium sulphate, almost insoluble, would thus be precipitated into pores of work and cause trouble.

*From The Monthly Review, A. E. S.

EDITORIAL

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CONTENTS

AS OTHERS SEE US

We clip the following from a British journal:

"We are pleased to hear that the Americans think that they have discovered the only way of dealing with strikes and trade unions (namely to have enough backbone to break every strike started regardless of cost), but all that we ask is, how long do they think it will last, and where do they think it will end? Even when a Louisville correspondent goes on to say that 'the coppersmiths are well unionized in Louisville, and are working on a 44-hour per week basis, and have gotten all reasonable requests without trouble,' he does not go on to draw the obvious conclusion, namely, that if the men want to 'unionize,' they will 'unionize,' and no amount of backbone or of satisfaction of their 'demands for reasonable requests' is likely to stop them."

"The facts, as far as we can gather them, are that the United States of America is teeming with strikes, from the dissatisfied miners upwards, and yet the representatives of each separate State are most anxious to assure us that a strike in America is a thing almost unknown. Thus we learn from Detroit that 'Detroit has been blessed during the year by having no serious labor upheavals; although this city is reported by authorities as one of the centres of labor radicals, manufacturers here have had a serene year. The strong hand of the Detroit Police Commissioner and good wages are believed responsible for present conditions. And from Philadelphia: 'This city has probably been more free from strikes than any other large industrial centre in the entire country.'

"It is evident also that when an American has to admit a strike, he puts it down to the aliens who interfere with the peaceful state of mind of the 'Americanized workman.'"

This is how we appear to the English, a matter of considerable importance of course, but of much greater importance, is how do we appear to ourselves? Have we a sufficient realization of our difficulties and even if so, are we taking steps to remedy them? These reports simply emphasize the fact that the most serious problem of the day is that of industrial relations.

FLURRY IN STRATFORD

In this issue of THE METAL INDUSTRY is the story of the commotion caused in England by the building of an aluminum works in Stratford-on-Avon. There seems to have been a pitched battle between the Shakespeareans and the present day commercialists, which drew many others into the discussion. A number of celebrities, social, literary and political, took up the protest against what they claimed would be a disaster to Shakespeare's shrine. On the other hand the friends of the new factory pointed out that a brewery, a chemical and gas works, and two brick-yards were already located in Stratford and nearer to the shrine than the aluminum works would be. An outcry was raised about blast furnaces and smoke-

chimneys, but this seems to have been effectually disposed of by the fact that the new factory is to be a manufacturing and not a reduction plant; hence there will be no blast furnaces, and no smoky chimneys.

What seems to us to be the most sensible view of the situation is that given by the Brooklyn Institute of Arts and Sciences, in which they say "The pilgrims, of whom there are many thousands, know that their Stratford-on-Avon can never be taken away from them, for the real Stratford-on-Avon is the town where Will Shakespeare was born and spent a considerable portion of his life. When he ceased to live there it passed from the sphere of transitory things, and became like himself, immortal, . . . a town of which the present Stratford is but the outer sign. . . . It is hard to suppress the vagrant thought that Shakespeare's town-folk may do him no discredit in that they are weary of their present title to fame. The great dramatist himself might have preferred factories to tourists, and the obscurations of smoke to those of persistent chatter."

It is hard for us to understand why a factory in itself is a desecration. To be sure, if it is ugly it is unpleasant, but not simply because there exists in the same town a sacred spot. In the strict sense there should be just as strong objection to ugliness in a factory town like Birmingham or our own Pittsburgh, as there is to the disfiguration of Stratford. In this particular case, however, there was no question of disfiguration. The whole controversy was brought about through the ignorance of most people of the actual conditions. To a certain type of "culture," the word factory means a blast furnace and smoke. It might be well for people of this type to realize that among the prerequisites of culture are a reasonable knowledge of science and technology; also, incidentally ability and the disposition to obtain facts before passing judgment.

PRODUCTION

The whole world of labor is demanding higher wages, shorter hours, and in some cases even an increasing share of the control of their industry. The whole consuming public is demanding lower prices. It is quite evident that these two demands are not easy to reconcile. Employers are unwilling to curtail their profits. Labor is unwilling to give up any of its wages. The only answer, the only thing that can possibly help in this crisis, and it is a crsis, is greater production. More food, more clothing. Our particular industry is not directly concerned with either food or clothing, but we have, nevertheless, a responsibility as great as any of the organizations which are. Our field is to provide metals, supplies and machinery, perhaps several steps removed from the production of immediate human necessities, but nevertheless, indispensable. If we are to have cheaper, food, clothing and dwellings, we must have more production and hence more metals and better machinery, and it is there that our responsibility lies. It is idle to expect a miraculous drop in prices or a surplus of labor, which will help to cut down the present costs. It is hardly likely that the American workman with his standards will relinquish anything willingly that he has gained, especially in the face of the present high cost of living. Our main hope is that through improved processes and machinery and the increased use of machinery in general, that we can turn out more per man at the same or lower prices. We realize, of course, that merely making such a simple and obvious statement will seem trite, and may seem an unnecessary repetition of what has been said and is bing said in every organ of publicity. Our reason, however, is that this problem should be particularly brought home to those who are not directly concerned with the food, clothing, or housing industries. It is easy to call a grocer or butcher a profiteer. It is equally easy to charge four times its value for a patented chemical, which will force a rise in the price of the material in which that chemical is used, or restrict the output of a necessary material thus adding to the cost of, let us say, a kitchen utensil. It is of the utmost importance to realize that no matter how many steps away from the so-called essential needs, an industry may be, the condition of that industry has a direct bearing on the prices of materials to the consumer himself.

QUESTIONS AND ANSWERS

In our work of answering inquiries we are often struck rather forcibly by the difference in type of questioner. Some questions are clearly written, simple and direct; others are quite the opposite. For example, one letter reads "Can you furnish us with a formula for white metal castings, or can you advise us where we can secure same." The business of helping people out of their difficulties (within the limits of our own ability, of course), is severely strained by such questions. It took us a very short time to write back, begging the inquirer for a little assistance and explaining to them that if we were to attempt to do as they requested we should have to stop our work for a week and devote ourselves to their inquiry. Other equally intelligent requests, such as "Please send us all possible information about die-making," or "Please let us know how we can make die castings," are often received.

It is not our desire to discourage the earnest seeker after knowledge. We have done and shall continue to do everything that we can to aid those asking for information. It should be plain, however, that the more specific the question, the clearer will be the answer.

PRIZES FOR ARTICLES ON CLEANING

An interesting contest which will stimulate thought on cleaning has been opened by the Oakley Chemical Company, of New York City. Prizes totaling $500 are offered for the best articles on the subject, "The Importance of Cleaning as an Essential Operation."

The best article will receive $100; the next, $75; the third, $50; fourth, $25, and the next twenty-five, $10.

The contest is open to all who are interested in cleaning. The judges are to be F. H. Colvin, American Machinist; F. C. Radley, Oakley Chemical Company; L. P. Alvord, Industrial Management, and C. Hutton, Textile World Journal.

One condition is that no mention of prepared or proprietary cleaners will be permitted. It is, in this way, assured that the articles will be honest statements of facts, as the author sees them, and not advertising matter or "boosts" for any concern. The contest is open until April 19, 1920. Details can be obtained from the Oakley Chemical Company.

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

PLATING IN SOUTH AMERICA

To the Editor of The Metal Industry:

You will no doubt recollect the name of the writer of this letter remembering my taking leave, and conversation we had before my departure for South America.

I believe you have already heard of my safe arrival and the things of interest during my trip, through the letter submitted to you through the courtesy of Mr. A. J. Lemrise, secretary of the Providence Branch, A. E. S.

My arrival at Buenos Aires was accompanied by many things to do, think, and also much to write. Many friends I have left behind, I promised to write and then others I was obliged to. You can readily see that a little scheming had to be done to satisfy everybody and yet at the same time save a little energy.

To the boys of the Providence Branch, for whom I have a deep affection, as friends and associates I felt it my duty, to write them a thorough description of my journey, and which I did. After doing so and summarizing the contents of same, I came to the conclusion that in order to kill two birds with one stone, I would request Mr. Lemrise to forward you this letter, after the members had the opportunity of acquainting themselves with it. I do hope my request has been fulfilled.

While you are already at this time more or less acquainted with the social end of this most progressive South American country, I will make an effort to deal in this letter with the industrial end, which to my judgment would be interesting. When I say "industry," I mean and refer to the one in which I am interested and acquainted with. During the many years I have been a subscriber of your worthy paper, I can hardly recall any time where any article published had any reference to the metal and plating progress in the South American countries. What reason there may have been for this I will not attempt to say definitely, but I figure that it was due to the fact of not having an interested party in the plating industry to contribute any article dealing with its progress in Latin-American countries.

Myself of a curious nature and very much interested in the above-mentioned industry, I made it my business to obtain as much information as possible. I had in mind to satisfy my desire of learning new things (as the old saying goes on, "You can learn something even from a fool," which I find very much correct), and also to transmit my information to others. It may seem strange to yon that I mention the above phrase, but for one that has seen how plating was done here in comparison with the work practiced in the States, the above phrase fits the management of plating here. Even though such may be the case, there has been much progress made, and it is worthy of taking the pains to speak about it. There are many improvements which could be made, but first I will speak of conditions as I saw them, and thereby give you food for thought on how American goods, in the line of modern plating, could fit here.

I will now enlighten you as to what steps I took in pursuit of my course. Please remember that in a new country with a new language confronting you (although I can speak Spanish fairly well, yet very far from perfect), it would be a hard task to ask permission to see the model plating departments they have here, and also thinking that I would not get all I would want to know, I took to the scheme of getting a "job" in a plating shop and which I will now explain in detail.

It was on Monday morning that I strolled out for a job, having in my possession a full list of plating establishments, some sixty or more, including factories, manufacturers of metal goods and those doing plating of some sort. I must not forget to mention the fact that a great banking institution which the Americans may feel proud of, the First National Bank of Boston, is very helpful to an American coming here, to a strange country unable to locate the necessary information he might need. From the above-mentioned bank I obtained the list and valuable data.

The remainder of this letter written by Harry Greene, formerly of Providence, R. I., goes into the descriptions of the experiences he had in various plating shops. It can be found on P. 81 of this issue.—Ed.

BAYBERRY WAX

To the Editor of The Metal Industry:

Have received your January issue, and it's great. Congratulations are in order and I "toikes me topper hoff to ye," as the bally Londoners say.

On page 36, under the heading "Shop Problems," there is an answer to problem No. 2778 that needs revision (or correction).

I hate to differ with Brother Blair in his answer anent the "Barberry recipe" when he advises the use of orange shellac varnish to coat metal patterns with, as in my humble opinion it is the very worst coating that could be applied unless we except Balsam of Fir. Then again he advises that the gum shellac be cut with grain alcohol, losing sight of the fact that same is now among the missing, or if procurable at all, is diluted with prune juice plus sixty-six per cent of aqua pura and used for beverage purposes only, at thirty to fifty dollars a gallon or fifty cents a drink, same carrying with it a kick guaranteed to last from Monday evening to church time the following Sunday.

Bayberry wax, which can be bought at any pattern shop supply house (those advertising in The Metal Industry preferred) at about one dollar a pound is the best coating for metal patterns, either iron or brass.

Heat the patterns first, just so that you can lay your hand on them, and apply the melted bayberry wax with a soft bristled brush.

Bayberry wax will melt at a very low temperature, and is in all respects similar to beeswax, but vastly superior to it as a coating for metal patterns.

Bayberry wax is extracted from the bayberry and is used mostly in candle making, as it gives forth a very pleasant odor while burning, thus reminding the owners thereof that they are at least "getting a smell for their money," if not a too brilliant illumination. With best wishes.

Feb. 5, 1920. William H. Parry.

NEW BOOKS

A new 8th edition of "Electro-Deposition of Metals," by Langbein and Brannt, is in course of active preparation and the publishers announce it to be ready on or about March 10.

The new edition has been completely revised, enlarged and brought up to date, and considerable new text matter and many engravings have been added. It is the foremost work in the English language treating on that subject and covers the most recent innovations and apparatus.

The interest of most readers will doubtless center in the main division of the volume, the practical part, which presents the industry in all its aspects, from the arrangement of electroplating establishments to actual methods used in the deposition of various metals. It is here that the plater finds a treasury of practice that he may turn to direct account in his business.

The book, which has been entirely reset, will contain 850 octava pages and 185 engravings. It will be substantially bound in cloth and the price will be $6.

The contents in brief is as follows:

HISTORICAL PART—I. Historical Review Electro-Metallurgy. THEORETICAL PART—II. Magnetism and Electricity. SOURCES OF CURRENT—III. Voltaic Cells, Thermo-Piles, Dynamo-Electric Machines. Accumulators. PRACTICAL PART—IV. Arrangement of Electro-Plating Establishment in General. V. Preparation of Metallic Objects. VI. Deposition of Nickel and Cobalt. VII. Deposition of Copper, Brass and Bronze. VIII. Deposition of Silver. IX. Deposition of Gold. X. Deposition of Platinum and Palladium. XI. Deposition of Tin, Zinc, Lead and Iron. XII. Deposition of Antimony, Arsenic, Aluminum. XIII. Deposition by Contact, by Boiling and by Friction. XIV. Coloring and Etching of Metals. XV. Lacquering. XVI. Hygienic Rules for the Workshop. XVII. Galvanoplasty (Reproduction). XVIII. Chemicals Used in Electro-Plating and Galvanoplasty. Appendix.

Metallurgical Calculations. By Dr. Joseph W. Richards, size 6 by 8¾ inches, cloth binding. Price, payable in advance, $5. Published by the McGraw-Hill Book Company, New York City. For sale by THE METAL INDUSTRY.

There are very few books to which one can point with complete confidence in their authority and accuracy. There are still fewer books which cover a large field successfully. This, however, is a book which does both. It is written by one of the foremost metallurgists of today; it is being translated into Italian, Russian, German, French and Spanish. This, as the author states in the preface, is an excellent sign that "the day of quantitative metallurgy is dawning all over the world, and that the application of the metallurgical calcuations is the path to metallurgical efficiency."

The work is divided into three parts:

Part 1. Introduction, Chemical and Thermal Principles, Problems in Combustion, Radiation, and Conduction of Heat. Part 2. Applications to the Metallurgy of Iron and Steel. Part 3. Applications to the Non-Ferrous Metals. A typical example of the practical applications is the problem on page 106, Part 1, which illustrates the method of obtaining the efficiency of a regenerative oil-burning metal-melting furnace.

Part 3 explains the processes involved and the calculations in the metallurgy of copper, lead, silver, gold, zinc, cadmium, mercury and aluminum. Illustrating every type of calculation are typical problems worked out in detail.

No metallurgist should be without this book.

Principles of Depreciation. By Earl A. Saliers, half morocco binding. Size 5¾ by 8½ inches, 200 pages. Price, payable in advance, $3. Published by the Ronald Press Co., New York City. For sale by THE METAL INDUSTRY.

There are many works on valuations. There are few, however, which specialize and explain the particular problem which is at the basis of all valuations, namely, depreciation. The importance of this problem to engineers and executives is rapidly becoming known, and depreciation in its various forms and phases is more and more taken into account.

Its importance is emphasized by the extension of governmental supervision of industry, and the necessity for knowing exactly the worth of a plant and its equipment in order to figure correctly the federal and state taxes. The book is divided into three parts: Part 1—Theory. Part 2—Practical Applications. Part 3—Determining the Depreciation Charge. It is of special value to metallurgical plants because of the large part which depreciation plays in such plants. The high temperatures used, the great strains which are applied to machines to accomplish the heavy work results in considerable and often very variable rates of deterioration. In addition, the steady development of metallurgical machinery forces the old appliances into obsolescence, and since this is now a recognized feature in depreciation it must be given due consideration.

Hendricks' Commercial Register of the United States for Buyers and Sellers, 28th Annual Edition 1919-1920. 2703 pages. Price, payable in advance, $12.50. Published by the S. E. Hendricks Company. For sale by (THE METAL INDUSTRY).

The new edition of this standard commercial work contains several improvements. The most noticeable being the new method of exterior indexing by coloring the front edge red, white and blue to indicate the different main sections of the book. First is blue, on which is stamped the words "Trades Index." The red section is the main classified trades list. The third section of the book, as indicated by the white edges, lists the trade names under which products are manufactured, with the name and address of the manufacturer. The second blue section is the alphabetical section, containing all the names in the book in one alphabetical list, with addresses and their main line of business. This is followed by the index to advertisers, containing a full list of branch and foreign offices following each name.

It is an excellent work, a copy of which should be in every sales and purchasing department. The list of trade headings covers, from the raw material to the finished article, all products connected with the Electrical, Engineering, Hardware, Iron, Mechanical, Mill, Mining, Quarrying, Chemical, Railroad, Steel, Architectural, Contracting and kindred industries, and the firms listed cover Producers, Manufacturers, Dealers, Jobbers and Consumers.

Complete Practical Machinist, by Joshua Rose, M. E. Size 5¼ x 7½, 547 pages, 432 illustrations, cloth binding. Price, payable in advance, $3. Published by Henry Carey Baird & Company, Inc., New York City. For sale by THF METAL INDUSTRY.

The new edition has been enlarged by the addition of much new material on machine tools and many new illustrations. This volume, which is intended for the practical workman and is written in the language of the workshop, gives full and practical instruction on the use of all kinds of metal-working tools, both hand and machine.

A PLATING DIFFICULTY

Q.—We have what to us is a problem in nickel plating this small article which I am enclosing.

May I trespass on your good nature by asking you to write and tell me what, in your opinion, would be the cheapest and best way for us to get this plating done in lots of from five to twenty-five thousands, and possibly one hundred thousands at a time? This is made of half-hard brass, and we wish to have a fairly good nickel plate put on and afterwards colored or buffed.

A.—The sample nickel-plated brass article you have submitted to us is very nicely finished.

Presumably the sample has been polished previous to nickel plating and color-buffed after plating.

A very good finish, however, can be produced by all mechanical methods, except the preliminary bright acid dipping of the articles. The manipulations should be as follows:

1st. Cleansing and bright acid dipping of the articles. Acid dip to be composed as follows:

Nitric acid, 38%	1 gallon
Sulphuric acid, 66%	1 gallon
Water	1 quart
Muriatic acid	2 ounces

Mix the acids in the order given and use when cold. The acid dip should be maintained below 60 degrees. This temperature can be maintained by keeping the acid jar containing the acids surrounded by running cold water.

When a sufficient quantity have been acid dipped, the next operation is to tumble the articles in an upright or oscillating tumbling barrel. Quite a number of pounds of ⅛-inch steel balls will be required to produce a high luster. The more balls used, the better the results will be obtained.

For a burnishing medium use 2 ozs. Proctor & Gamble's Soap Ships and 1 oz. Tri-Sodium Phosphate per gallon of water. Add sufficient of the mixture with the article and balls so that a good lubrication may be maintained. When the articles have been tumbled for three to four hours they should have a bright finish and be ready for nickel plating.

After ball burnishing the articles should be washed in water and immersed in a cleaner of the usual type maintained at 200 deg. Fahr. to remove the slight coating of grease that may develop from the soap chips. After cleansing, rewash in water, immerse in a cyanide dip.

Water	1 gallon
Sodium Cyanide	4 ozs.

for a moment, rewash in water, and nickel plate by the barrel method. Any of the mechanical plating barrels advertised in THE METAL INDUSTRY will give results. The nickel solution should be made up as follows: After using for a short time the proportions may be increased to increase the rapidity of the nickel deposit.

Water	1 gallon
Single Nickel Salts	8 ozs.
Boracic Acid	1 oz.
Common Salt	½ oz.
Epsom Salts	1 oz.
Voltage 6 to 8.	

Replenish the solution upon the same basis, using a concentrated solution. Plate the articles for at least one hour and a half. Then ball burnish after washing in water. The same burnishing combination may be used, except a little sodium cyanide may be added to prevent the nickel staining. One-quarter oz. per gallon of burnishing fluid will be ample. After burnishing wash the nickel parts in clean cold water and then dry out by the aid of clean boiling water and maple wood sawdust.—C. H. P.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

CHOCOLATE BRONZE FINISH

Q.—I would like to have your advice on how to get a brown-black oxidizing on brass. I want to get the cheapest and quickest process. I have to make a few 1,000 pans, 14 inch.

A.—The production of dark chocolate bronze tone upon brass is much more difficult than if the brass were copper plated or made from a brass high in copper, so will require manipulation to produce the desired results. We would suggest the following manipulations:

1. Cleanse and bright acid dip the parts.
2. Immerse in a solution consisting of the following:

Water .....1 gallon Temp. 180° Fahr.
Copper Sulphate .....1 pound

Immerse the brass parts for a few seconds in the hot copper solution. They will assume a green or gold tint. Then remove, wash in water and immerse in the following solution:

Water ..... 1 gallon Temp. 160 to 180° Fahr.
Polysulphide..... 4 to 6 ozs.
or
Water .....1 gallon 160 to 180° Fahr.
Sulphide Barium ..... 1 oz.
Caustic Soda .....½ oz.

Either solution will give an oxidized effect if the articles are previously treated in the copper sulphate solution. Afterwards remove, wash, dry and finally scratch brush to bring up the color.

If the articles made from brass were only slightly copper plated the Barium Sulphide solution would give the desired results immediately.

Another solution that can be used in the place of the copper sulphate to give the basic surface is:

Muriatic Acid ..... 1 gallon
Sal Ammoniac ..... 1 pound
Copper Sulphate ..... 1 pound

This solution can be used cold. Other manipulations as outlined—C. H. P. Problem 2,783

GILDING

Q.—Do you know of a cheap gold solution for a dull finish? I have a lot of graphophone needle cups to gold plate a dull gold finish.

A.—There is no such a thing as a cheap gold solution as long as fine gold must be used in its preparation. It is possible that you can save time and labor by using a dip gold solution. Such a solution should be maintained in a cast iron kettle, preferably of the steam jacketed type. For small operations a good sized cast iron preserve kettle can be used, heated externally by a blue flame gas plate.

Your work to be gilded should have the dull or brush brass finished surface applied before immersing in the gold dip.

The formula for such a solution as you require is as follows:

Water ..... 1 gallon
Gold Trisalyt ..... ⅓ oz.
Sodium Perrocyanide ..... 8 ozs.
Soda Ash ..... 2 ozs.
Causic Soda ..... 1 oz.
Phosphate Soda ..... 2 ozs.
Sodium Cyanide ..... ¼ to ½ oz.

Temperature 160 to 180 deg. Fahr. Replenish the solution, as the gold becomes depleted with gold trisalyt, and a very small amount of cyanide, ⅛ oz. per gallon of solution.—C. H. P. Problem 2,784.

PLATING

Q.—What are toning salts?

A.—Toning salts commonly used for electro-galvanizing solutions is sulphate of aluminum. This salt may be used as a toning or brightening agent in proportions of one ounce upwards per gallon of solution. Boracic acid makes another good toner.

A good replenishing and toning salt for zinc sulphate solutions is as follows:

Commercial Zinc Sulphate..... 10 ozs.
Aluminum Sulphate ..... 2 ozs.
Boracic Acid ..... 4 ozs.

Mix the salts together and add one or two ounces per gallon of solution at frequent intervals when the solutions are in operation.—C. H. P. Problem 2,785.

Q.—What is the best way to apply a pure gold finish on a silver backing?

A.—The only way to apply a pure gold finish upon a silver backing is to electroplate.

If the silver is to be protected from the deposition of the gold then a stop off varnish will have to be applied to the silver to protect it. An asphaltum paint prepared by Devoe & Reynolds can be used for the purpose.

The gold solution should be prepared as follows:

Water ..... 1 gallon
Gold Trisalyt ..... ½ oz.
Sodium Cyanide 96.98%..... ⅛ oz.
Phosphate Soda ..... ¼ oz.

Temperature about 100 degrees Fahr.

Just as long as the practice is continued of dissolving nitrate of silver direct in sodium cyanide trouble will ensue. The sodium nitrate formed in excess causes the trouble. The only remedy we can suggest to increase the conductivity of the solution is the addition of a small amount of sal ammoniac, say ¼ oz. per gallon.

The solution may register 11 deg. Beaume; but the question is how much actual metal does the solution contain? With an excess of sodium nitrate in solution, possibly not more than half ounce of metal. To avoid such difficulties use silver cyanide in replenishing the solution dissolved in an equal amount of sodium cyanide.—C. H. P. Problem 2,786.

Q.—Will you give me the formula to copper plate a glass jar and how to prepare the glass so that it will conduct as I want to copper plate in a cyanide copper solution with current?

A.—We will answer your question by first stating that you cannot copper plate a glass jar in a cyanide solution, unless the jar is previously metallized, by burning in a silver paint such as is used in preparing glass or china for the regular silver deposited ware.

Your method will oe as follows: Be sure that the glass is thoroughly clean and dry. Apply platers' copper bronze powder mixed with a turpentine copal varnish to a fluid state. Reduce the varnish with turpentine. The spraying method of applying would be the best. If you have no spraying apparatus then apply evenly with a camel's hair brush. Two thin coats will be better than one heavy coat.

The bronze coating should be thoroughly dry and hard before plating. A copper sulphate solution should be previously prepared, as follows:

Water ..... 1 gallon
Copper sulphate .....2½ pounds
Sulphuric acid ..... 1 ounce

Temperature, normal. Voltage, one. Use soft copper anodes.

Before placing the jar in the copper sulphate solution prepare a silver dip, as follows:

Water ..... 1 gallon
Silver cyanide ..... ¼ ounce
Sodium cyanide ..... ½ ounce

Immerse the copper bronzed glass jar in the silver dip for a moment. The result will be a whitening of the copper bronze. Remove, wash in water and copper plate.

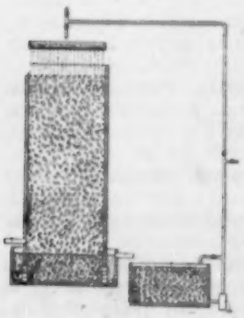
The reason for whitening in the silver dip is that the rate of deposition of copper can be more readily determined when the jar is first placed in the copper solution—C. H. P. Problem 2,787.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

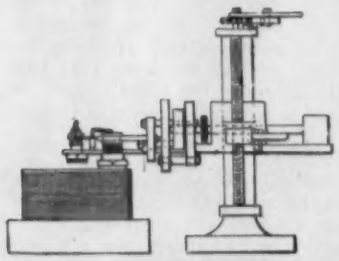
1,314,715. September 2, 1919. **Manufacture of Zinc Chloride.** Oliver Wendell Storey, Madison, Wis., assignor to C. F. Burgess Laboratories, a corporation of Wisconsin.

The literature states that Zinc is not attacked at atmospheric temperatures by dry chlorine. I have found, on the contrary, that dry chlorine does attack zinc at atmospheric temperatures with the formation of a film of zinc chloride on the surface of the zinc. This film of zinc chloride acts as a protective coating for the zinc and effectively prevents further action by the chlorine. When water vapor is present in or associated with the chlorine, the zinc is rapidly corroded by chlorine at atmospheric temperatures with the formation of zinc chloride. I have found, however, that the formation of a highly concentrated zinc chloride solution on the surface of the zinc acts as a protective coating on the zinc and retards the action of chlorine on the surface so protected. I have discovered that further action by the chlorine on a zinc surface so protected may be secured by diluting the concentrated liquor or by removing it entirely.



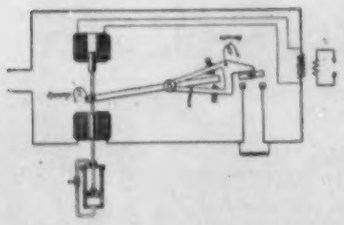
1,316,430. September 16, 1919. **Apparatus for Separating and Feeding Sheets to Cold Rolls, Pickling, Tinning, Galvanizing, and Like Machines.** David Davies, of Llanelly, Wales.

This invention relates to apparatus for separating and feeding sheets in connection with cold rolls, pickling, tinning, galvanizing and like machines, of the type in which the sheets are raised and fed by a suction carrier having a reciprocating action, and in connection with which it has been proposed to successively elevate the pile of sheets through the medium of a screw worm operated from the suction carrier mechanism by a pawl and ratchet wheel.



1,314,515. September 2, 1919. **Automatic Switching Device for Electric Metal-Working Apparatus.** James H. Gravell, Brooklyn, N. Y., assignor to Thomson Electric Welding Company, Lynn, Mass., a corporation of Massachusetts.

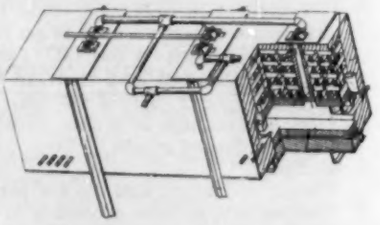
The invention is especially applicable to electric metal working apparatus in which a step down transformer is employed although some of its features are applicable to other forms of apparatus.



One of the objects of my invention is to facilitate the operation of the apparatus so that work may be done at greater speed owing to the fact that the operations are entirely automatic and in response to the act of the operator of the machine in merely inserting and withdrawing the work from the heating circuit, thereby avoiding the use of mechanically operated switches for turning the welding or heating current off and on either at the beginning or close of the operation.

1,315,252. September 9, 1919. **Furnace.** Arthur L. Stevens, Chicago, Ill.

My invention relates to the construction of a furnace having a relatively long, narrow combustion chamber and hearth, such, for example, as a drag furnace employed for heating metal rods, bars, or the like.

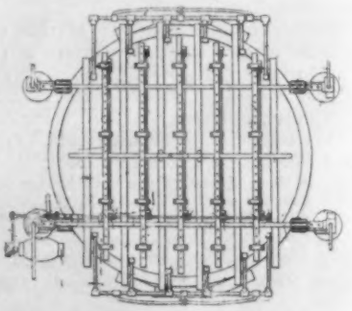


The principal object of the invention is to provide a furnace of this character operating on the regenerative principle so designed and constructed as to insure uniform and high temperature in the combustion chamber for the full length thereof with economy of fuel.

A further object is to provide a furnace of this type which will be relatively small and compact in its structure, which will be inexpensive to build, and in which the cost of maintenance and repairs will be reduced to a minimum. The furnace of my invention is intended particularly for fluid fuel and is especially adapted for burning a lean producer gas.

1,315,785. September 9, 1919. **Electrotyping Apparatus.** George A. Lutz, Cranford, N. J., assignor to American Circular Iron Company, Pittsburgh, Pa., a corporation of Pennsylvania.

An object of my invention is to provide improved means for rotating articles to be plated while in an electrolytic bath during plating, and a further object is to provide means whereby one or more articles may be hung suspended in such a bath while being rotated therein during plating.

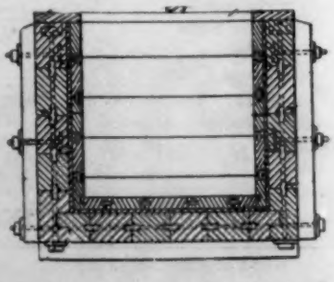


A further object of my invention is to provide a cathode frame, that is adapted to be placed in operative position over an electroplating tank and to be removed from such position, which means to rotatively support and to rotate articles suspended from such a cathode frame and to permit ready connection of said rotating means with and the disconnection thereof from mechanism for actuating the same.

1,315,241. September 9, 1919. **Acid Tank.** William T. Russell, Detroit, Michigan.

My invention relates to acid tanks, shown in the accompanying drawings and more particularly pointed out in the following specification and claims.

One object of this invention is to provide a strong, substantial tank constructed of wood, with an inner wood lining or tank held in spaced relation to the first named tank by a plurality of dovetailed members respectively engaging the walls of the outer tank and also the walls of the inner tank or wood lining;—the space between said walls being filled by an acid resisting wall of plastic material.

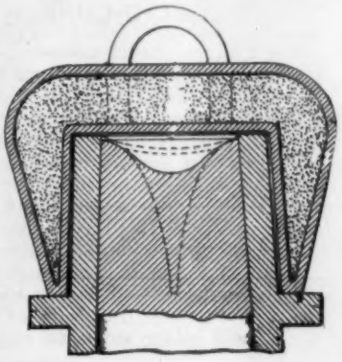


Another object of the invention is to "break" the joints between the members forming the walls of the tanks by strips which bridge the abutting edges and are lodged in recesses formed in the respective members.

Another feature of the construction are bolts which extend transversely through the respective members forming the walls of the tank to secure the several members in abutting relation.

1,315,944. September 16, 1919. **Anti-Piping Means for Ingot Molds.** John Brunner, of Evanston, Illinois.

This invention relates to the ingot-molding art, and more particularly to means for preventing piping.



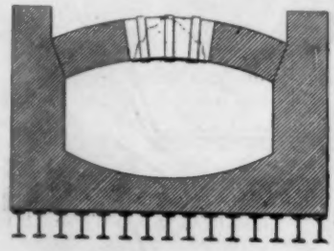
The main object of the invention is to prevent piping.

Another object is to provide a novel ingot mold equipment for preventing piping.

Generally speaking, these and other objects are accomplished by providing in combination, an ingot mold, and means for covering a portion thereof for preventing piping.

1,316,298. September 16, 1919. **Hanger Unit.** Benjamin Gold, Hobart, Indiana.

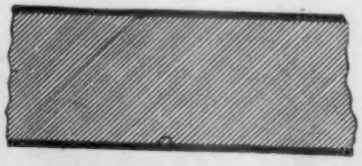
This invention relates to hanger units for use in repairing the roofs of furnaces, as for example open-hearth furnaces, it having been devised for use, more particularly, though not exclusively, in carrying out the improved method forming the subject of the pending application for U. S. Patent Serial No. 289,338, filed April 11, 1919.



The primary object is to provide a novel, simple and inexpensive construction of hanger unit for use in the repairing of furnace roofs, and more particularly, though not exclusively, in the repairing of roofs in accordance with the improved method hereinbefore referred to.

1,314,603. September 2, 1919. **Electrode Coating.** William Roy Mott, Lakewood, Ohio, assignor to National Carbon Company, Inc., a corporation of New York.

This invention relates to an improvement in carbon or graphite electrodes for electric furnaces, and more particularly to an improved coating material for such articles, as well as other carbon or graphite articles which are to be subjected to high temperatures in oxidizing atmospheres.

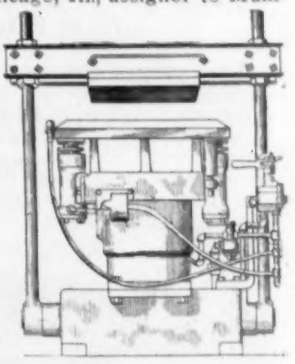


The object is to eliminate the present disadvantages by the use of metal coatings applied to the finished electrode.

1,316,297. September 16, 1919. **Art of Repairing Furnace-Roofs.** Benjamin Gold, Hobart, Indiana.

The primary object is to provide improvements in the art referred to whereby the labor cost of repairing the roof will be very greatly reduced, a great saving in time and material will be effected, and, in general, a better job result, the brick-layer will be protected from the heat of the furnace, which may be relatively great during the repairing operation, the repairs may be made while the furnace is very hot compared with the heat of the furnace when repaired in accordance with prior methods; and the spalling off of the bricks will be prevented.

1,316,616. September 16, 1919. **Split-Pattern Molding Machine.** William P. Krause, of Chicago, Ill., assignor to Mumford Molding Machine Compat y, of Jersey City, New Jersey, a corporation of New Jersey.

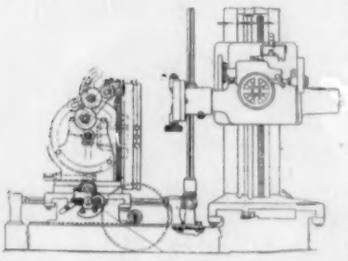


This invention relates to i mprovements in split pattern molding machines and has for its principal object to provide in conjunction with such a machine new and improved means for lifting the flask frame and flask.

Another object consists in providing a new and improved valve-controlled means for the control of said flask-lifting device.

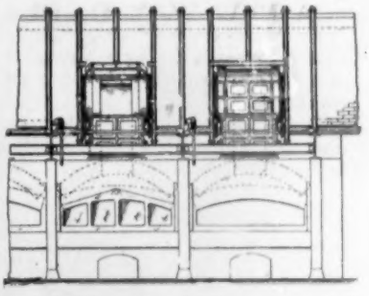
1,316,221. September 16, 1919. **Metal Working Machine.** Conrad M. Conradson, of Madison, Wis., assignor by Mesne assignments, to Landis Tool Company, of Waynesboro, Pa., a corporation of Pennsylvania.

This invention relates to metal-working machines, and especially to a type of machine adapted to present an operative tool to the work at any desired angle and with any desired direction of feed movement. To this end, in its more complete embodiment, the invention comprises a milling cutter with its axis mounted for angular adjustment and for feed movement in different planes, in conjunction with a universally adjustable work-table, likewise having feeding movements in different directions.



1,316,267. September 16, 1919. **Metallurgical Furnace.** Walter O. Borcherdt, of Austinville, Virginia, assignor to The New Jersey Zinc Company, of New York, N. Y., a corporation of New Jersey.

This invention relates to metallurgical furnaces, and has for its object the provision of certain improvements in such furnaces. More particularly, the invention relates to metallurgical furnaces for producing volatile metallic oxids, or sulfates, or basic sulfates, such as zinc oxid, lead oxid, lead sulfate, and the like, or mixtures of two or more of them. The aim of the invention in this connection is the provision of an improved furnace construction enabling the convenient firing, charging and working of the furnace without contamination of the flue system with impurities.



1,314,588. September 2, 1919. **Electrolytic Process.** Kenneth S. Guiterman, New York, N. Y.

This invention relates in general to an electrolytic process for scouring the electrodes from electrolytic cells of their by-products deposits and specifically relates to such a process incidental to the precipitation of cobalt oxides by electrolysis from solutions containing soluble salts of cobalt. While the process is applicable to the scouring of metal deposits of any character from electrodes, the refinements of the process have been worked out experimentally and practically.

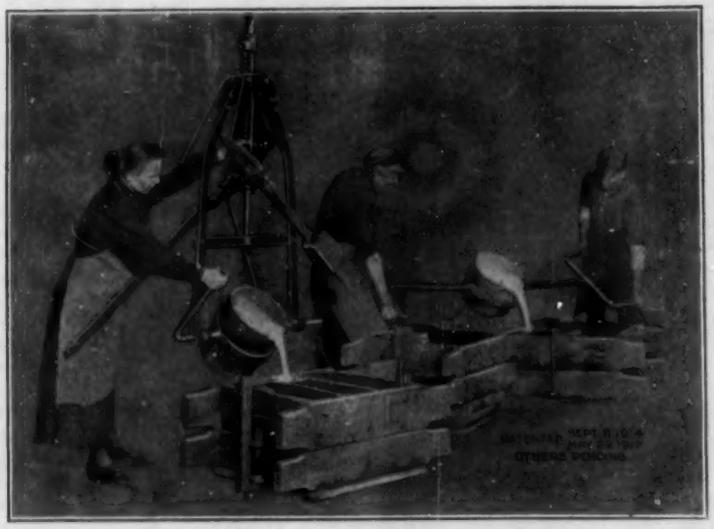
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

NEW POURING DEVICE

A new pouring device, which, it is claimed, represents the latest ideas in machine pouring has been put on the market by the E. J. Woodison Co., Detroit, Mich. In foundries where the machines have been installed, they have quickly paid for themselves. The manufacturers state that one man, with this device, can pour almost three times as much as two with the old shank method and in less time. The pouring has been more accurate, fewer spills, and accidents and burns almost eliminated.

By means of a set of adjustable levers and a counterbalance a man gets mechanical advantage great enough to lift over 500 pounds. A ladle of 400 pounds capacity is easily lifted to a height of eighteen inches owing to the leverage. The molder does not have to carry his metal and his work is altogether easier and more pleasant.

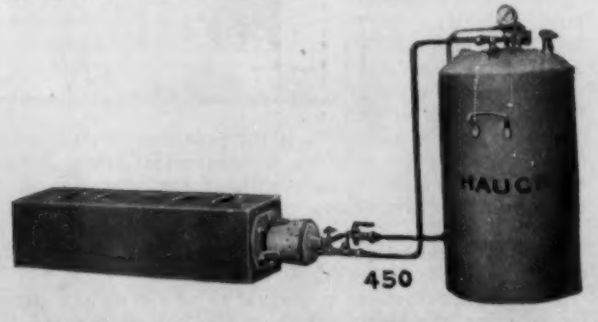


WOMAN POURING METAL.

A NEW WAY TO HEAT SMALL LADLES

A practical, yet simple way to heat a number of small ladles at a time, is to use an arrangement like that shown in the illustration.

The device consists of a sheet iron box reinforced with angle iron and lined with firebrick, a Hauck furnace burner and a 20-gallon steel oil tank.



The ladles are placed bottom up over the opening of the box and the flame of the oil burner shoots up through the openings, drying the lining of the ladles. The firebox can be made any desired length to heat any number of ladles.

The burner consumes any grade of fuel, crude or kerosene oil in connection with compressed air from 20 to 100 lbs. pressure. Supplied with regulating valve and mounted on a flange which is bolted to one end of the box. The steel tank is equipped with 150-lb. gauge, oil and air regulating valves. The connections between the burner and the tank can be made with pipe. This is one of the recent developments of the Hauck Manufacturing Company, Brooklyn, N. Y.

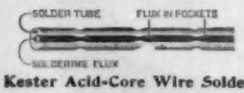
ACID-CORE WIRE SOLDER

The Chicago Solder Company, 218 North Union avenue, Chicago, Ill., are manufacturers of Kester Acid-Core Wire Solder. This solder is ready to use because the soldering flux is contained within the solder tube.

The solder is a hollow wire filled with a soldering flux in a series of cells or pockets. The soldering flux feeds with the solder, also the flux is already mixed to the proper strength and in correct proportion to the solder. This saves time, labor and material, as the solder and flux are together, eliminating the necessity of a separate soldering flux. The solder is made from Straits tin and St. Joe lead, both absolutely pure metals.

It can be used with or without a soldering iron and will solder any metal except aluminum.

A SPOOL OF SOLDER.



Kester Acid-Core Wire Solder.

Kester Acid-Core Wire Solder is said to be especially suited for automotive repair work. It is recommended by the makers for battery terminals, gasoline tank and carburetor connections, electric light connections, speedometer flexible shaft, spark plug terminals, cracked fenders, radiator leaks, wire connections and general garage repairs. It is sold by leading hardware, mill supply, electrical and automotive accessory jobbers in 1 lb. coils in cartons and on 1, 5, and 10 lb. spools.

NEW OXIDIZING LIQUID

The Hanson and Van Winkle Company, Newark, N. J., have just put out a new oxidizing liquid for copper, bronze and silver. The oxidizing liquid is a new product for use making an oxidizing solution producing, as they claim, better results than Sulphuret or its substitutes, now sold, at much lower cost, as it will not deteriorate and will keep indefinitely. Another advantage claimed is the elimination of waste.

FORMULA.

Water	1 gallon
Oxidizing liquid	¼ fluid ounce

It is to be used as a dip. Use stoneware pots or tanks or a plain wooden tank not lined. When used hot in a stoneware pot tank place these in a hot water bath. After the article has been oxidized the high light is brought out by slightly touching the work to a felt wheel or buff charged with rouge or other fine polishing composition. For certain finishes, either steel or brass wire scratch brushes are used. Articles of brass, iron or steel must be first copper plated. The work should finally be given a coating of good quality lacquer. It is sold in tin cans of any size or in barrels.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

A. E. S. NATIONAL CONVENTION

H. C. Bernard, of the Rochester Branch, announces that preparations are being started for the Eighth Annual Convention of the A. E. S., which is to be held in Rochester from June 30, 1920, to July 3, 1920, inclusive. Headquarters will be the Seneca Hotel.

NEW YORK BRANCH BANQUET

The 11th Annual Banquet of the New York Branch of the American Electroplaters' Society was held in the evening of February 21 at the Broadway Central Hotel, New York City. It was preceded by a meeting of the branch, at which the following papers were presented:

1. Some Facts Concerning Low Voltage Dynamos, by Mr. Schweinsberg. Read by Mr. Little.
2. Electro Deposition of Copper on Wax, by Royal F. Clark.
3. Deposition of Nickel and Cadmium, with Silver, from Silver Cyanide Solution, by M. E. Stewart.
4. A Problem in Copper Plating, by F. Haushalter. Read by W. Voss.
5. Determination of Gold aand Silver in Cyanide Solutions, by Mr. Piske. Read by W. Schneider.
6. Bright Nickel Deposits, by Mr. Miller.
7. Work of N. Y. Branch of A. E. S., by Joseph Haas.

After the papers the usual discussion took place, and as the papers were of a very high order the discussions were very warm. A great deal of very valuable information was published. Of special interest to the members present was a description of a method of plating bright nickel deposits by Mr. Miller. He passed around a sample which showed one of the prettiest bright nickel plates that had ever been seen.

The deposition of nickel and cadmium, with silver, from silver cyanide solutions also caused much discussion pro and con. It was a record of a few preliminary experiments carried on by Mr. Stewart just to feel out the problem. He had not gone far enough to make any broad statements about the practicability of the process, but his results seemed to point out that it was perfectly feasible to plate cadmium with silver, up to about 25 per cent. cadmium. Whether or not the solution would last so that the work could be carried on for some time, his experiments had not gone far enough to determine. The deposition of nickel with silver was almost impossible beyond a very small percentage. Most of the members present, however, seemed to feel that the deposition of cadmium with silver was a much more difficult problem than Mr. Stewart's work had had a chance to point out. There were other difficulties which made it hard to put into commercial practice.

At the banquet, John E. Sterling, president of the New York Branch, gave a short talk, telling briefly of the growth of the A. E. S.; how it had developed from a little body into a national organization with almost 800 members. During the past year 15 firms had applied for men, but the A. E. S. had only five men to offer. Of these five only two were without a position, the other three wishing to make a change. This record of membership was all the more remarkable in view of the fact that only one or two men in each plant were eligible to membership. The lines are very strictly drawn, and only those who qualify as real electroplaters are admitted.

Two speakers were scheduled to appear, Dr. A. W. Claflin, who was to talk on the American Electroplaters' Society, Its Opportunities and Responsibilities, and Charles P. Madsen, on the subject of Malleable Nickel Process and Constitution and Properties of Nickel. Unfortunately, Dr. Claflin was prevented from appearing by illness, but Mr. Madsen gave an interesting lecture on nickel.

The committees were as follows:

BANQUET COMMITTEE

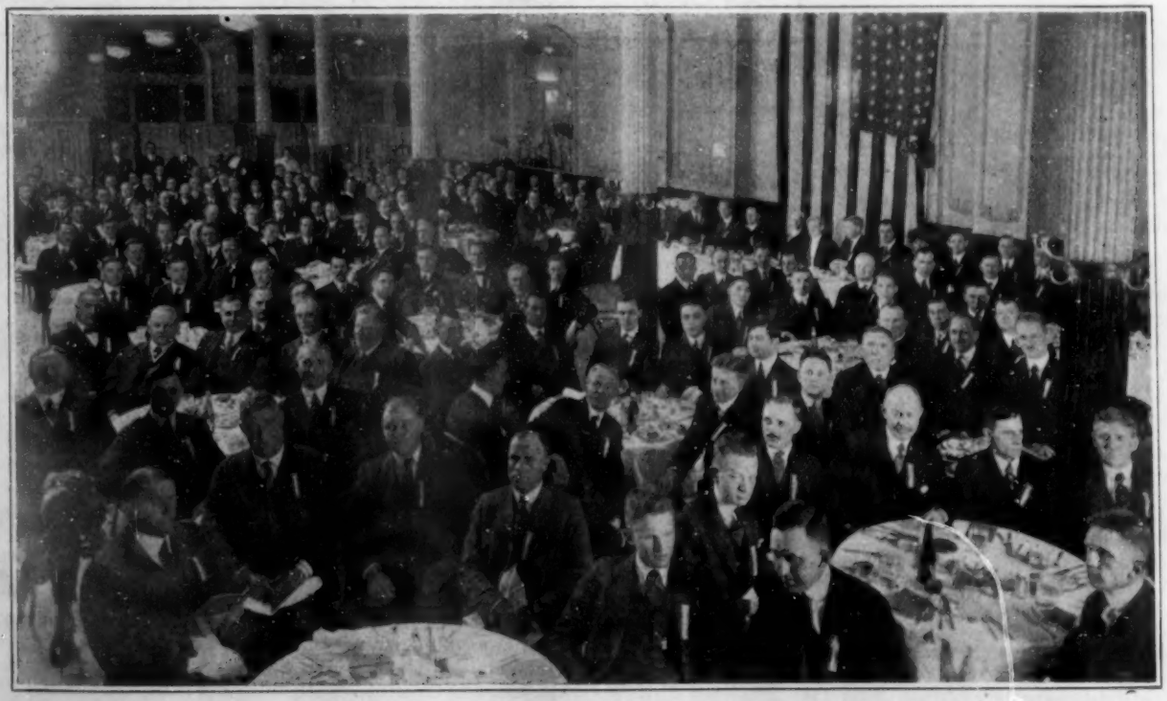
William Fischer, Chairman;

Thomas B. Haddow,	H. C. Flanigan,
William Voss,	Joseph Minges,
Benjamin Popper,	John Burke,
J. A. Stremel,	Stanley Schubert.
William J. Schneider,	Joseph Haas

RECEPTION COMMITTEE

Thomas B. Haddow, Chairman;

H. C. Flanigan,	L. M. Graham,
C. H. Buchanan,	Benjamin Popper,



ELEVENTH ANNUAL BANQUET OF THE NEW YORK BRANCH, A. E. S., HELD AT THE BROADWAY CENTRAL HOTEL, FEB. 21, 1920.

G. W. Schweinsburg, M. E. Stewart,
Harry Maynard, Thomas Brown,
H. Miller, Phillip Morningstar,
William Voss.

Attractive and useful souvenirs were distributed, an ash tray for each guest, by the Celluloid Zapon Company, and a pocket notebook by the Egyptian Lacquer Manufacturing Company.

PITTSBURGH BRANCH A. E. S.

The live wire general committee who have been appointed, with power to act, are keeping close touch with each other and with the work which they have in hand. The work is the producing of a banquet properly befitting such an educational society as the A. E. S. The banquet will be put on in the English Room of the Fort Pitt Hotel, and every effort will be made to have as nearly as possible every potential member of the A. E. S. residing in the Pittsburgh district present at 7 o'clock p. m. on Saturday night, April 17, 1920. The program committee, who are under the same chairmanship as the publicity committee, are getting out a neat little historical souvenir which will be given to all guests present as a reminder of the occasion.

ROCHESTER BRANCH BANQUET

Upwards of seventy persons attended the banquet, which also turned out to be a Valentine party, among them some thirty or more ladies. Of course there was an ulterior motive in admitting the womenfolk to the function this year—that of consulting with them as to the arrangements for entertaining wives of delegates who will attend the forthcoming convention—but the men polished their coup in excellent style, and no one would ever have guessed what the underlying motive was in inviting the ladies; no one except the ladies.

President George H. Hesselink presided at the dinner, and there were brief after-dinner talks by Alfred A. Ruttan, of the Premo Division of the Eastman Kodak Company, and others. Everyone was provided with elaborate festive headgear—with special hats for the women. And everyone received some artistic and useful souvenirs—with special ones for the women. There was an orchestra and singing, led by W. F. Johnson, employment manager of the Taylor Instrument Companies—with special songs for the ladies. And then, after the entertainment and frivolity was over, there was much talk about the serious business of engineering the coming convention—with special work, and lots of it, for the ladies. But they seemed to relish this latter idea even more, as they had all of the kindness and attention which they had received earlier in the evening.

NEWARK BRANCH A. E. S.

This branch is also awake and stirring. The annual banquet will be held on April 3, 1920, at the Achtel-Stetter Banquet Hall, 842 Broad street, Newark, N. J. Tickets will be $3 each. Ladies are invited.

ST. LOUIS BRANCH

This branch is not to be left behind any of the others. Their seventh annual banquet will be held on March 6, 1920, at the American Hotel Annex, St. Louis, Mo. Reservations can be made through E. J. Musick, 915 Chestnut street.

NEW YORK BRASS FOUNDRYMEN

The Metropolitan Brass Founders' Association, at its annual meeting in New York re-elected its officers for the ensuing year. These are as follows: President and chairman, Frederick H. Landolt, proprietor of the Penn Brass & Bronze Works, Brooklyn, N. Y.; secretary and treasurer, William H. Paulson, Thomas H. Paulson & Son; executive board, E. O. Marshall, R. Hamilton & Sons; D. A. Vander Werken, Tiffany Studios and Thomas H. Williams, E. A. Williams & Sons. During the past year the association has shown a healthy growth. It has undertaken to impress upon the trade in the metropolitan district the benefits resulting from the association's work.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

E. A. Maraffi, of Bridgeport, Conn., is installing a complete polishing and plating department for the Leeds Manufacturing Company, Bridgeport, Conn.

J. B. Mendenhall, who was formerly sales manager of The Lewin Metals Corporation, St. Louis, Mo., has been appointed assistant to the president.

L. D. Simpkins has left the Peters Cartridge Company to accept a position as metallurgist with the National Lead Company, Brooklyn, N. Y.

F. G. Baldwin, Fourth National Bank Building, Cincinnati, Ohio, has been appointed sales representative for Southwestern Ohio, for the Stark Rolling Mill Company, Canton, Ohio.

Joseph Minges, formerly with the Cutler-Hammer Manufacturing Company, New York City, is now foreman of the plating department of the Consolidated Pin Company, Bloomfield, N. J.

Albert Lemrise has resigned his position with Markham and Stone, Providence, R. I., and has opened a job plating plant with **James Simpson** at 7 Beverly street, Providence, R. I.

E. M. Bond, formerly metallurgist and chemist of the American Platinum Works of Newark, N. J., has resigned to assume similar duties with the Interstate Smelting & Refining Co., Newark, N. J.

E. M. Lewis, who has been for some years sales manager and later secretary and treasurer of the Hill & Griffith Company, resigned that position on January 1 and has now accepted the position of general sales manager with the E. J. Woodson Company, Detroit, Mich.

Arlington Bensel, vice-president Driver-Harris Co., Harrison, N. J., resistance wire and alloys, has been in Europe since Nov. 18, visiting the plant of Driver, Drennen & Cooper, Manchester, England, as well as the continent to look over the general export situation. He will be absent several months.

Stuart B. Marshall, consulting engineer and metallurgist, who formerly was general manager of the American Manganese Manufacturing Company, and general superintendent of the Aluminum Company of America's North Carolina developments recently of Badin, N. C., now has his headquarters in Washington.

Chas. A. Dreisbach, formerly president and manager of The New Haven Sand Blast Company, and **Chas. S. Johnson,** formerly Western representative of the same company, are now associated with The Standard Equipment Company, of New Haven, Conn. The Standard Equipment Company is the manufacturer of cinder mills, ore crushers and pulverizers and is shortly to add a modern line of foundry equipment.

DEATHS

MISS KATHRYNE M. HAUN

Miss Kathryne M. Haun, treasurer of E. F. Houghton & Company, Philadelphia, died of pneumonia, February 9, at her home, 1332 Wagner avenue, Philadelphia, after a short illness. She is survived by her mother, Mrs. Fredericka L. Haun, and a sister, Miss Emma W. Haun, who resided with her. She was born in Philadelphia on January 2, 1876.

On September 4, last, her twenty-fifth anniversary with Houghton & Company was celebrated at a dinner given by other old employees and executives of the company.

MISS KATHRYNE M. HAUN.

She entered the employ of Houghton & Company as a mere slip of a girl, doing some minor clerical work, and rose by successive stages. At the incorporation of the company in 1910, the appointment of one of the male executives to the treasurership was considered as a matter of course until it was found that there was not a man in the organization who had the grasp of the company's affairs nor was as capable a financier as Miss Haun. She was at that time in actual charge of the financial affairs, having been for some years previous the clerical assistant and private secretary of the surviving partner of the firm, the late Aaron E. Carpenter. For some time previous to the death of the latter in 1914, at an advanced age, Miss Haun had sole responsibility, not only for the company's finances but for those of the largest stockholder, Mr. Carpenter. She actively represented his personal interests.

Through her work in handling the finances of a growing manufacturing concern, Miss Haun was known in banking circles in both the eastern and western sections of the country. Her judgment had a weight in the banking and business world such as is seldom accorded a woman.

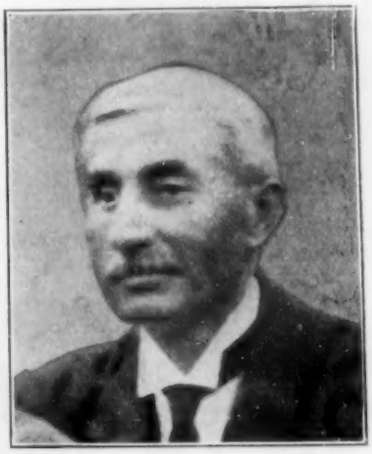
HERMANN GEHNRICH

As we go to press, word comes to us that Hermann Gehnrich, 68, president Gehnrich Indirect Heat Oven Co., Brooklyn, died at his home in Brooklyn, N. Y., Feb. 18. He established the business in 1880, which was incorporated in December, 1915.

JOHN C. WIARDA

John C. Wiarda, 59 years old, for many years head of the firm of J. C. Wiarda & Co., manufacturing chemists, at 273 Green street, Greenpoint, Brooklyn, died at his home. Mr. Wiarda is survived by a daughter, Anna B.; a son, John Wiarada, and a sister, Mrs. W. F. Vanden Houten.

Mr. Wiarda was born in New York City on March 11, 1860, and was educated in Hanover, Germany, and in Brooklyn. He was former president and treasurer of L. A. Eberhardt & Co. He was a member of the Society of Chemical Industry, the Brooklyn League, the 17th Ward Board of Trade and of James McLeer Camp, Sons of Veterans. Mr. Wiarda was an enthusiastic yachtsman and for years sailed his own yacht, the Lorita. He was a former commodore and member of the Jamaica Bay



JOHN C. WIARDA.

and Great South Bay Yacht clubs. His wife, Mrs. Rosa Ann Wiarda, died last June.

JOHN BOOTH BURRALL

John Booth Burrall, prominent in Waterbury manufacturing interests, died suddenly at Palm Beach, Fla., where he was spending the winter, on February 8. He was president of the Plume & Atwood Manufacturing Company and of the American Ring Company. He was a director in the American Pin Company, of the Waterbury Castings Company, and the H. D. Bronson

JOHN BOOTH BURRALL.

Company, of Beacon Falls. His father, Edward Milton Burrall, was also prominent in local manufacturing.

Mr. Burrall was born in this city in 1879, the grandson of John M. Burrall. He was a graduate of Taft School, Watertown, and of Yale University, in the class of 1902. He was married May 30, 1916, to Mrs. Margaret Fallon Barber, of Waterbury. Mr. Burrall was a member of the Waterbury Country Club, the Home Club, the University and Yale Clb, of New York, and the Country Club of Farmington.

He leaves beside his wife and mother, Mrs. Mary E. Burrall, of this city, and one sister, Mrs. Eunice Burrall Tatcher, of New York City.

ALBERT SANDERS HILLS

Albert Sanders Hills, of Haydenville, for twenty years treasurer of the Haydenville company, died at the home of his brother, C. J. Hills, as the result of a shock. Mr. Hills appeared to be in perfect health and was suddenly stricken while at his desk at 5 o'clock in the afternoon.

He was born in Haydenville on October 10, 1859, the son of the late Mr. and Mrs. Jacob Hills. He was educated in the Williamsburg schools, and graduated from Williston Seminary in 1879. He was employed by the Haydenville Manufacturing Company for some time, then went into business for himself in Philadelphia, manufacturing plumbing supplies for six or seven years. He then returned to Haydenville, and with his two brothers, C. J. and R. B. Hills, took over the Haydenville Manufacturing Company. He had become the strong arm of the concern, and it will be difficult to fill his place. He was treasurer of the Puro Sanitary Drinking Fountain Company, the Progressive Iron Foundry and Machine Company, and the Victory Equipment Corporation, all owned by the Haydenville Company.

JAMES B. LAW

James B. Law, retired manufacturer of sheet metal goods, died at his home, 53 Arlington avenue, Providence, R. I., at 1 o'clock on the morning of Saturday, January 3, his 80th birthday, after a protracted illness. Mr. Law removed to Providence in 1885 and purchased the James Hill Manufacturing Company, 56 Westfield street. He withdrew from active business in June, 1909.

The son of James Law and Mrs. James Law, of Thompsonville, Conn., he was educated in the schools of that place. Throughout the Civil War he served with the 22nd Connecticut Volunteers, and later became a member of Arnold Post No. 4, Grand Army of the Republic, of Providence.

As one of the firm of Law Bros., he manufactured iron kegs and other supplies for the Du Pont powder plants at Hazardville, Conn., until his coming to Providence, 35 years ago. His surviving relatives are his widow, one daughter and one granddaughter.

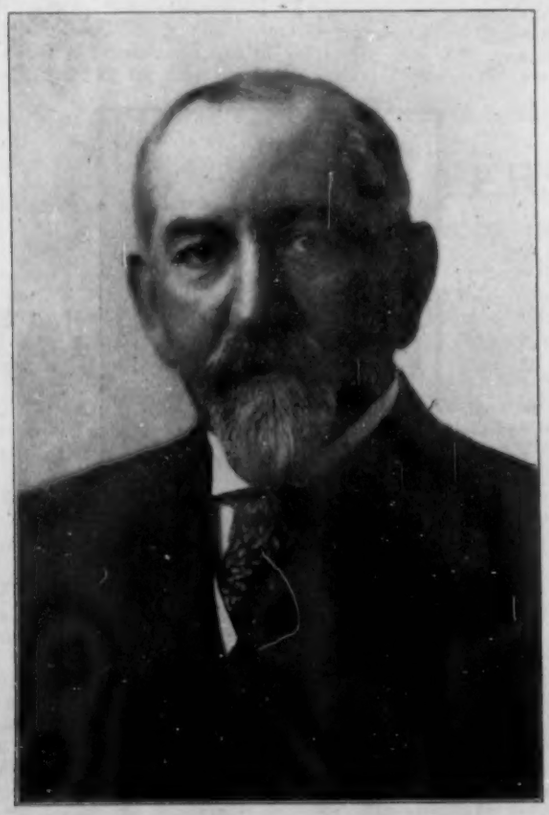
TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW OFFICERS OF WATERBURY COMPANIES

FEBRUARY 16, 1920.

Charles F. Brooker, president of the American Brass Company, retired from his office after more than 50 years as a corporate officer in the company and its predecessors, at the twenty-first annual meeting of the company on Feb. 3. He is now in his 56th year of continuous service,* and will now hold the position of chairman of the board of directors. John A. Coe, who succeeds Mr. Brooker as president, has been connected with the company and its predecessors for 28 years. He has served as sales manager, vice-president, and now president.



CHARLES F. BROOKER

At the same meeting the board of directors was increased from 15 to 19 members, all of the old directors being re-elected and George H. Allen, Frederick L. Braman, William A. Cowles, Arthur M. Dickinson being elected to the board as new members.

John P. Elton was elected vice-chairman of the board and first vice-president. Clifford F. Hollister was elected treasurer, Edmund H. Yates, secretary. All of the vice-presidents were re-elected. F. E. Weaver was made a vice-president in charge of sales in Waterbury.

The full list of directors now is: Charles F. Brooker, James S. Elton, Edward L. Frisbie, T. Brownell Burnham, Cleveland H. Dodge, John E. Wayland, Royall Victor, Alton Farrel, Frederick L. Braman, James A. Doughty, John P. Elton, Gordon W. Burnham, Thomas B. Kent, Arthur C. James, John A. Coe, Harris Whittemore, George H. Allen, William A. Cowles and Arthur M. Dickinson.

The officers are: C. F. Brooker, chairman of the board of directors; John P. Elton, vice-chairman and first vice-president; John A. Coe, president; E. L. Frisbie, executive vice-president; Thomas B. Kent, executive vice-president; Gordon W. Burnham, executive vice-president; Clifford F. Hollister, treasurer; Major W. Judge, assistant treasurer; S. Burnam Terry, assistant treasurer; Edmund H. Yates, secretary; Elton S. Wayland, assistant secretary.

Following are the appointive vice-presidents in charge of the branches: A. S. Brown and W. A. Cowles, Ansonia; F. L. Braman, of the Coe Brass branch in Torrington; H. M. Steele, of the Waterbury Brass branch in Waterbury; A. M. Dickinson, of the Benedict and Burnam branch in Waterbury; G. H. Allen, of the Kenosha branch in Kenosha, Wis.; F. M. Wills, of the Buffalo branch, and F. E. Weaver, in charge of the sales at Waterbury.

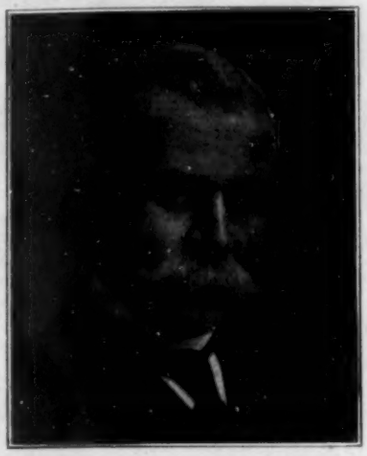
In his retiring speech, Mr. Brooker gave a report of the condition of the corporation as well as of his own term of service with the company. He said in part:

"The twenty-one years just passed have brought more or less changes, although we have been free from serious changes in the personnel of the management. Your president is now in his 56th year of continuous service with the company and its predecessors, having served this company as president from its organization 21 years ago, as president of the Coe Brass Manu-

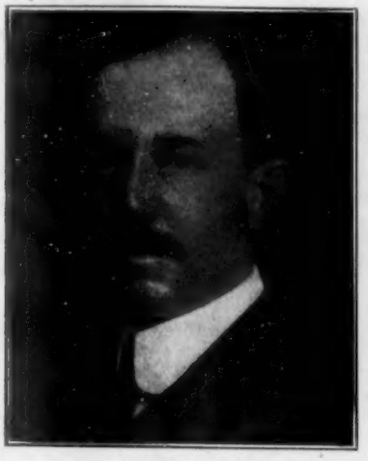
*See "A Half Century with the Metal Industry," in THE METAL INDUSTRY, May, 1914, P. 192.

facturing Company seven years and secretary 23 years, in all more than 50 years as corporate officer.

"Our acquisition of the Kenosha and Buffalo mills with improvements at both places, combined with those made in our Connecticut mills, have enabled us to maintain our relative position in trade and during the war and to serve the Government



JOHN A. COE,
President American Brass Company.



JOHN P. ELTON,
First Vice-President American Brass Company.

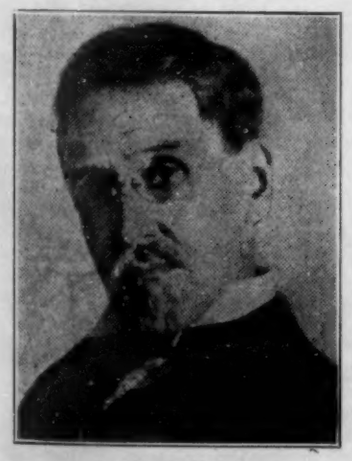
EDWARD O. GOSS,
Vice-President, Treasurer and General Manager Scovill Manufacturing Company.

in such a manner as brought from the authorities most complimentary expressions as to our patriotic services.

"At the height of the war period, our sales amounted to over $175,000,000 a year, and I am particularly pleased to say that we have substantially carried on our business with our own capital. The extra wear and tear of our equipment through the excessive demands of the Government during the war have been made good by improvements, and the cost of all was met by the results of our operation.

"Our initial dividend No. 1 was paid in February, 1900. The last disbursement, No. 86, was paid in November, 1919. The aggregate amount paid stockholders in cash during the 21 years was $28,246,817.50. This with stock dividends in July, 1907, of $2,50,000 makes a total of $30,746,817.50. The first dividend was paid to 170 stockholders, the last to 1,830, 1,507 of whom were residents of Connecticut, showing how widely our stock has been distributed, more or less to our own employes."

All of the officers of the Scovill Manufacturing Company were re-elected at the annual meeting of directors, officers and stockholders of the Scovill Manufacturing Company on February 11. These officers are: Mark L. Sperry, president; Edward O. Goss, vice-president, treasurer and general manager; John H. Goss, secretary and general superintendent; Leavenworth P. Sperry, assistant secretary, and Clayton M. De Mott, assistant treasurer.



MARK L. SPERRY,
President Scovill Manufacturing Company.

Members of the board of directors for the coming year are Chauncey P. Goss, W. Shirley Fulton, and Frederick J. Kingsbury, Mark L. Sperry, Edward O. Goss, John H. Goss, Clayton M. De Mott and Leavenworth P. Sperry.

The annual statement of the Scovill Company shows that the net earnings for 1919 were $2,156,024.97, or over $25,000 more than during the previous year when the entire plant was being devoted to the manufacture of war munitions.

The amount spent on construction during the past year showed a decided decrease. In 1918 the sum of $4,114,003.60 was spent on additions to land, buildings, and machinery, while during the past year the sum of $855,746.55 was devoted to that purpose.

Following is the annual statement of the Scovill Company for the year 1919:

ASSETS

	Dec. 31, 1919.	Dec. 31, 1918.
Land, buildings and machinery, as of January 1	$8,870,078.89	$7,752,768.00
Net additions during year	855,746.55	4,114,003.00
	$9,725,825.44	$11,866,771.00
Depreciation	1,253,794.60	2,996,693.00
	$8,472,030.84	$8,870,078.00
Cash and certificates of deposit	1,509,886.11	2,791,403.00
U. S. Government securities	6,637,596.23	4,265,077.00
Other bonds and securities	4,402,635.47	2,524,424.00
Stocks in other companies	75,058.25	5,058.00
Accounts and bills receivable	2,125,733.33	2,841,965.00
Merchandise	7,037,955.86	6,672,936.00
	$30,260,896.09	$27,970,944.00

LIABILITIES.

Capital stock	$5,000,000.00	$5,000,000.00
Surplus	16,227,006.63	15,096,103.55
Reserves	6,000,000.00	4,000,000.00
Accounts and bills payable	877,864.49	168,124.18
Unliquidated advances on contracts	.....	1,575,813.91
Net earnings	2,156,024.97	2,130,903.08
	$30,260,896.09	$27,970,944.72
Surplus, December 31	$18,383,031.60	$17,227,006.63

The Scovill Manufacturing Company lent its aid to Waterbury during the influenza epidemic in opening one of its buildings as a temporary hospital. It was not necessary to use it.

Waterbury manufacturers are showing exhibitions in the state agricultural and industrial exhibition in Hartford this week, showing the war work done here.

The American Brass Company has recently introduced the plan of paying its employes by checks, believing that it encourages saving. The idea is that the employe will go to the bank to cash his check and while there deposit some of it.

The Waterbury Body Corporation, recently organized in this city, has started the manufacture of auto bodies for trucks, jitney buses and small deliveries. The concern has taken over the

Austin Machine Shop in Thomaston and in 60 days expects to employ 100 persons. The quarters in Thomaston are only temporary and the officials of the company are negotiating for a three-acre tract in Waterbury.

The plans are already drawn for a new concrete factory building 200 by 200, equipped with the latest machinery. Carl Eckhardt is president of the firm and Louis Raffel, secretary, treasurer and general manager.

The wage system inaugurated by Mr. Raffel is a distinct benefit to the employes. Upon a man's entering the employ of the concern he is encouraged to start a savings account with the company. If he leaves of his own free will he receives the money and six per cent on his savings. If found inefficient and discharged before the six months are up he will be given only four per cent. This will tend to do away with the disgruntled employe, it is thought. Those that remain in the employ of the company for one year or more will receive ten per cent on their savings. In this manner it is hoped to obtain trusted and efficient workers.

A New York concern has already placed an order for 20 bus bodies for service in Mexico; another company in Wabash, Ind., has signed up for 10 bodies, and the U. S. Motor Corps of Washington, D. C., has also contracted for busses.—D. H. P.

TORRINGTON, CONN.

FEBRUARY 16, 1920.

The assessed valuation of property of manufacturers in Torrington has been increased by the reassessment committee from $6,675,634 to $9,178,898. This is an increase of approximately 37½ per cent. The list of new valuations—which, however, does not include some of the smaller concerns—is as follows: American Brass Company, $3,901,120; Excelsior Needle, $900,905; Fitzgerald Manufacturing, $89,395; Hendey Machine, $976,942; Hotchkiss Brothers, $270,451; Progressive Manufacturing, $239,357; Standard, $937,848; Torrington Building, $33,763; Torrington Manufacturing, $239,900; Turner & Seymour, $447,004; Union Hardware, $784,463; Warrenton Woolen, $357,750; total, $9,178,898. These valuations, of course, are fixed purely for taxation purposes.

Among the annual reports filed at the town clerk's office during the past month were the following:

Turner & Seymour Manufacturing Company—President, Charles F. Brooker, of Ansonia; vice-president, John A. Coe, of Waterbury; treasurer, Francis H. Griffiths; assistant treasurer, W. W. Cotter; secretary, Henry S. Washburn; directors, Charles F. Brooker, John A. Coe, John P. Elton, of Waterbury; Edward L. Frisbie, of Waterbury; Edward H. Green, of New York; Thomas W. Bryant, Frank M. Travis, Francis H. Griffiths and W. W. Cotter.

Torrington Manufacturing Company—President, James A. Doughty; vice-president, Robert C. Swayze; treasurer, F. M. Matthews; secretary, Henry G. Ellis; assistant secretary, Wadsworth Doster; directors, James A. Doughty, Robert C. Swayze, L. G. Turner, George H. Braman and Wadsworth Doster.

Hotchkiss Brothers Company—President, Edward H. Hotchkiss; vice-president, Walter A. Hotchkiss; treasurer, Harry J. Wylie; secretary, E. C. Rougeot; directors, Edward H. Hotchkiss, Walter A. Hotchkiss, Harry J. Wylie, Clive B. Vincent and F. H. House, the last named being of Hartford.

Hendey Machine Company—President, Charles H. Alvord; vice-president, Robert C. Swayze; treasurer, Charles H. Alvord; assistant treasurer, Fred W. Fuessenich; secretary, F. N. McKenzie; assistant secretary, John Jack; directors, Frederick F. Fuessenich, Charles H. Alvord, Robert C. Swayze anud William E. Fulton.

The Community Co-operative Company, recently incorporated for the purpose of conducting a store for the factory workers of Torrington, has elected the following directors: Walter Harrison, representing the American Brass plant; Henry Healey, Excelsior Needle plant; E. T. Overton, Standard; R. R. Richards, Progressive; Joseph C. Lakin, Hendey Machine; John Whalen, Turner & Seymour; David Lindsay, Union Hardware; Eugene Bartram, Torrington Manufacturing, and Asa H. Wilcox, general group. The directors in turn elected the following officers: President, Walter Harrison; vice-president, Joseph G. Lakin; secretary, David Lindsay, and treasurer, E. T. Overton. The Community company began its activities by placing on sale during the past month 40,000 pounds of sugar in an effort to relieve the sugar shortage which had been acute in Torrington for some time. The sugar was offered in 21-pound bags at $4 per bag and the entire supply was sold within six hours. Hundreds were turned away when the supply had been exhausted. J. M. Palmer has been appointed manager of the company.

David A. Sullivan, who has been employed for several years at the local plants of the Torrington Company, sailed January 31 for England, where he will assume his duties with the American Supplies Company in London, one of the foreign branches of the Torrington Company. He was accompanied by his wife and children and will remain in England for an indefinite period.

Announcement was made during the past month that negotiations had been completed whereby the Hartford Electric Light Company takes over the Connecticut Power Company, which operates the new hydro-electric power plant at Falls Village under a liberal charter with state-wide powers. It is understood that one million dollars was involved in the deal. Torrington and other towns in the Naugatuck Valley are among the places in Connecticut supplied with power from this big plant. The deal was one of the largest and most important that has taken place in the state in recent months. It was put through by Stone & Webster and New Haven men who own the power proposition.

George D. Lyford has been re-elected president of the Torrington Business Men's Association.

James A. Doughty, who is prominently identified with The American Brass Company, has refused re-election as president of the Thomaston National Bank of Thomaston, after having served for 13 years in that capacity.

The Torrington Roofing and Sheet Metal Company, capitalized at $10,000, was incorporated during the past month. The incorporators are W. H. Morrison, Martin F. Leininger and Burton H. Morrison.

Torrington manufacturers were well represented at the industrial exposition held at the state armory in Hartford early in February. Among those who had exhibits were American Brass Company, Fitzgerald Manufacturing Company, Hendey Machine Company, Hotchkiss Brothers Company, Turner & Seymour Manufacturing Company, Union Hardware Company, Warrenton Woolen Company, Torrington Manufacturing Company, and the Torrington Company Progressive plant.

Notice of the formation of a limited partnership under the firm name of the Charles H. Barr Company, Limited, has been filed by Charles H. Barr, Cornelius R. Duffie and John H. Lancaster, of Litchfield, "the principal business of the company being to design, manufacture and market novelties of metal and other materials."

Henry G. Ellis, secretary of the Torrington Manufacturing Company, was nominated by the republicans for re-election as warden of the borough of Torrington.

Two additional directors were elected at a special meeting of the Brooks Bank & Trust Company on January 22. They are Frederick L. Braman, of the American Brass Company, and Howard J. Castle, of the Torrington Building Company.

The Bridgeport Castings Company's plant in Bridgeport was destroyed by fire during the blizzard early in February. The company is composed of former Torrington men. A new plant will be erected, it is said.

A new power press, weighing 25,000 pounds, has been installed at the plant of the Trumbull-Vanderpoel Company in Bantam.

PROVIDENCE, R. I.

FEBRUARY 16, 1920.

Following one of the biggest bumper years in history, January added another link to the chain of industrial prosperity with indications favorable to an indefinite continuance of the rush. In common with other industries, all lines of the metal trades are busy, with sufficient orders on hand to keep the plants running at capacity for a long time to come. As has been the case for many months, there is the same handicap through scarcity of labor, especially of the expert or experienced type. Although wages are the highest ever paid in this section, this does not prove a strong enough magnet to attract all the help desired to turn out the amount of production necessary to meet the demands.

This condition is particularly applicable to the various branches of the manufacturing jewelry industry. The concerns engaged in the production of jewelry of all grades entered upon the new

year with books well laden with orders—hurry orders at that—as many of the retail and jobbing stocks throughout the country were sadly depleted by the holiday avalanche which the manufacturers were unable to check. The inability to secure stock during the holiday season will result, the manufacturers believe, in an earlier placing of orders this year, and this, it is expected, will materially tend to a stabilization of the industry. In fact the unusual invasion at this period of the year by buyers would indicate that early buying will be one of the initial features of the new year.

Collections in the jewelry trade are reported to be unprecedentedly good, with few failures. Customers are paying their bills with regularity and the wholesale merchants are receiving their payments with corresponding promptness.

Brown & Sharpe Manufacturing Company's apprentice department is making a modern school dormitory of the big three-story dwelling at 58 Park street, corner of Woodland street, Providence. This new apprentice home will house 27 of the half-hundred out-of-town boys attending the training course conducted by this concern. In announcing the plans, J. Edward Goss, supervisor of apprentices, said: "For several months past we have felt that it would be a good thing to have such a rooming house, since more than ever we are getting high school boys from out of town, who are used to comfortable homes. We now have nearly 200 boys, including about 50 from out of town. Many of these boys have no relatives or friends here, and it has been a matter of ourselves locating them in rooming houses. Lately this has become difficult because of the housing conditions here. We don't propose to make it institutional at all, but as good a substitute for the boy's real home as possible.

"With all of the boys having common interests, it will be possible to hold 'home evenings' for talks by practical men to supplement our lecture work. Boys will be allowed to room there only during apprenticeship. In fact we are continually raising our standards, making it more difficult for boys to get in or to stay in, except boys who mean business and have a real interest in the trade they elect—whether training in the shops from department to department or in practical mathematics and drawing, or the illustrated technical lectures by experts from the plant, or outside."

The structure is a three-story wooden building, which is to be thoroughly renovated, with new hardwood floors throughout, painting, repapering and electric lights. New showers, tubs and bathroom fixtures will be installed adequate to permit a half dozen boys to use them at once. In all of the apprentices' rooms will be placed new mission furniture selected for comfort, with a wide spring cot and sofa blanket, rug, chiffonier and mirror, and arm rocker for each boy. Every room will have a study table and chair. There will be bookcases and a stand for technical and popular fiction magazines in the large living room on the first floor front. In addition to the extension service of the public library, the school is also building up a technical library, carefully O. K.'d by the shop foremen. The home is to be operated under the apprentice department, probably by a Brown & Sharpe man and his wife.

The annual meeting of the corporation of the Manufacturing Jewelers' Board of Trade was held at the rooms of the association in the Turks Head building, Providence, on January 27, at which time the following officers and directors were elected: President, Frederick A. Ballou, of B. A. Ballou & Co., Inc.; first vice-president, William P. Chapin, of the Chapin & Hollister Company; second vice-president, Maurice J. Baer, of the Baer & Wilde Manufacturing Company, Attleboro, Mass.; secretary-treasurer, Horance M. Peck. Trustees for Three Years—Henry Wolcott, of the Wolcott Manufacturing Company. Directors—William P. Chapin, of the Chapin & Hollister Company; Everett L. Spencer, of the E. L. Spencer Company; Alfred K. Potter, vice-president of the Gorham Manufacturing Company; Le Favour H. Bosworth, of the Potter & Buffinton Company; Frederick D. Carr, of the Ostby & Barton Company; Frederick A. Ballou, of B. A. Ballou & Company, Inc.; Henry Wolcott, of the Wolcott Manufacturing Company; Charles A. Russell, of the Irons & Russell Company; Frederick V. Kennon, of the John T. Mauran Manufacturing Company; J. Henry A. Moultrop, of H. C. Lindol & Company; Henry G. Thresher, of the Waite & Thresher Company; Howard G. Maker, of the Baker-Manchester Manufacturing Company; William T. Chase, of the C. H. Cooke Manufacturing Company; George H. Holmes, of the George H. Holmes Company, and Morgan W. Rogers, of Parks Bros. & Rogers, all of Providence; Maurice J. Baer, Harlan A. Allan, Louis S. Chilson and Joseph Finberg, all of Attleboro, Mass.; Frederick E. Sturdy, George A. Whiting and John J. Sommer, all of North Attleboro; and Thomas Allsopp, of Allsopp & Allsopp, Newark, N. J.

Alfred H. Higgins, whose home is at 132 Wallace street, Providence, on Monday, January 26, completed forty years of continuous service with the Nicholson File Company. During practically the entire period Mr. Higgins has been foreman of the finishing department. He was born 62 years ago at Wellfleet, Mass., but removed to Providence when he was 12 years old. In 1880 he went to work for the founder of the concern, William T. Nicholson, and during nearly half a century he has seen the plant grow until now it is the largest concern of its kind in the country and one of the largest in the world.

H. J. Astle & Company, of Providence, has installed several of the Boland patented sand blasts and blowers in the factory of the Canadian Sunbeam Lamp Company, at Toronto, Canada. Another has been set up in the Art Work Shop at Buffalo, N. Y. In the American Hardware Company's plant at New Britain, Conn., the local company has installed a large Boland pressure blower and a similar system has been placed in the Keystone Screw Company's plant at Philadelphia. The Astle Company has a number of large contracts on hand for the installation of these systems in different parts of the country.

The Thornley Supply Company, 40 Thornley street, Pawtucket, has issued on announcement that it is now equipped to do all kinds of nickel plating, making a specialty of automobile reflectors and bumpers.

More orders than can possibly be filled in nearly a year have been received for the production of the R. Plews Manufacturing Company, Central Falls, manufacturers of tin cylinders and sheet metal products.—W. H. M.

ROME, N. Y.

FEBRUARY 16, 1920.

Business is good in the metal industry plants of this city and everything points to a successful new year. In connection with the purchase of the wire department of the B. F. Goodrich Company, of Akron, Ohio, by the Rome Wire Company, the following statement was given out here:

"The management of the Rome Wire Company feels that in order to give proper service to their customers, it is necessary to increase the facilities for manufacturing electrical wires and cables. It is well known that the company is operating its plant at the present time to its full capacity and has recently purchased the wire drawing and rubber insulating departments of the B. F. Goodrich Company of Akron, Ohio.

"Eleven acres of land with buildings in Buffalo, formerly known as J. J. Carrick, Inc., plant, have been purchased to which location they are moving the wire departments from Akron, Ohio.

"The company has decided to sell a sufficient amount of 7 per cent cumulative preferred stock to finance the Buffalo branch, which will be operated under the name of Rome Wire Company, Diamond branch. The company also expects to somewhat enlarge its local plant, so part of the proceeds of the sale of stock will be used in Rome."

At the annual meeting of the stockholders of the Rome Hollow Wire and Tube Company, held on January 27, the following directors were elected: F. J. DeBisschop, James A. Spargo, Barton Haselton, Hon. J. D. McMahon and F. M. Shelley; inspectors of election, Lester Wilson, Carl Tietz. At a subsequent meeting the following officers were elected: President and general manager, F. J. DeBisschop; vice president, James A. Spargo; secretary and treasurer, F. M. Shelley.

The annual meeting of the stockholders of the Rome-Turney Radiator Company was held at their offices on January 28, when the following directors were elected for the ensuing year: Dr. W. L. Kingsley, G. G. Clarabut, Barton Haselton, George W. Turney and W. L. Lynch. At a subsequent meeting of the directors the following officers were elected for the ensuing year: President, Dr. W. L. Kingsley; vice president, Barton Haselton; treasurer and general manager, George W. Turney; secretary, W. L. Lynch; assistant secretary, Harry W. Gerwig. The inspectors of election were H. J. Rowland and Harry W. Gerwig.

The annual meeting of the stockholders of the Rome Brass &

Copper Company was held on January 28, when the following trustees were elected: W. P. White, R. F. Hubbard, Barton Haselton, F. A. Ethridge, J. J. Armstrong, W. W. Parry, H. T. Dyett, J. M. Read, H. D. Wolfe; inspectors of election, N. S. Thomas, J. J. Russell. At a subsequent meeting of the trustees the following officers were elected: President and general manager, Barton Haselton; vice president, J. J. Armstrong; secretary and sales manager, H. J. Rowland; treasurer and assistant general manager, H. D. Wolfe; assistant secretary, J. J. Russell; assistant treasurer, N. S. Thomas; works manager, Weston Jenkins; executive committee, B. Haselton, J. J. Armstrong, F. A. Ethridge, H. T. Dyett.

The stockholders of the Rome Wire Company held their annual meeting on January 20. The following directors were elected for the ensuing year: A. F. Carpenter, J. H. Dyett, T. Harvey Ferris, H. W. Barnard, H. T. Dyett, F. M. Potter, C. R. Keeney, P. C. Thomas and S. H. P. Pell. At a subsequent meeting of the directors the following officers were chosen: President, H. T. Dyett; vice president, F. M. Potter; treasurer, H. W. Barnard; secretary and assistant treasurer, C. R. Keeney.

The annual meeting of the stockholders of the Electric Rod Mill, Inc., was held on Tuesday, January 20, and the following directors were elected: H. W. Barnard, H. T. Dyett, T. Harvey Ferris, C. R. Keeney and F. M. Potter. At a subsequent meeting of the directors the following officers were chosen: President, H. T. Dyett; vice president, F. M. Potter; secretary and treasurer, C. R. Keeney.—M. J. D.

ROCHESTER, N. Y.

Feb. 16, 1920.

Weather conditions have had a serious effect upon manufacturing in this city during the past month, shipments of finished products and deliveries of materials having been constantly interrupted. Railroad service in and out of the city has been nearly paralyzed during the past three weeks, and manufacturers have been forced to fall back upon their reserve stocks in order to maintain operation and keep pace with orders and business anticipated.

Owing to so much use of water power and electricity in Rochester the coal shortage because of weather conditions has not been felt here as keenly as in other cities, which manufacturers have discounted in advance. But failure of the rail lines, due to tremendous snow fall and high winds, have made immense inroads into the stocks of all kinds of metals.

Purchasing agents at all the larger plants say they expect no slowing up in the output of finished products, however, and the advent of spring will be taken prompt advantage of to replenish any shortage in stocks that may have been created by the unusually severe winter of 1920.

It was fortunate that most big plants were well supplied with copper, brass and tin. The National Lead Company's representatives have carried big reserve stocks for more than a year past, and the tying up of the railroads has not caused any alarm in the direction of the lead supply. Aluminum is short, and has been for some time.

The accumulation of material for shipment is a serious proposition just now, and although the railroads are apparently making every effort to open the lines to free usage and to get loaded cars out on the way, there is an element of discouragement here and there because of the continued bad weather. Many warehouses are now taxed for space to receive finished goods ready for shipment and urgently needed.

Every big plant in Rochester is looking forward to another season of overtime in the coming spring months. Particularly is this true at the can plants, the several tools works and the Bausch & Lomb optical works. Every form of metal is used in these concerns, particularly in the optical works. Three shifts are now being employed in some departments of the Eastman Kodak Co.'s plants. G. B. E.

WORCESTER, MASS.

Feb. 16, 1920.

Shortages in coal are causing Worcester manufacturers no end of worry and although many of them have several times been near to the predicament of closing none have yet been so hard hit that this has been necessary. Some of the shops, as well as hospitals of the city, have found it necessary to use coke. The reason for the shortages is that the government has seized many carloads of soft coal consigned to this city.

There has been little change in the industrial situation in Worcester or surrounding towns since the start of the year. The busy times which characterized the close of the year for most of the firms continues and labor difficulties have been conspicuous because of their absence.

The new village which is being built by the Norton Company on the north slope of Indian Hill is rapidly developing. Already 77 cottages out of the 100 being built for the help at the company shops have been roofed and boarded in, and a dozen more cellars have been started.

The name of the Worcester Machine Works has been changed to the Churchill, Morgan, Crittsinger Company, and the officers now are: President, Ralph L. Morgan; treasurer and general manager, Lewis M. Crittsinger; third director, Edwin Churchill.

The company makes an internal grinding machine for such surfaces as the inner surfaces of the combustion engine cylinder. The machines are necessary in a wide variety of businesses, being used beside in the automobile business in the business of manufacture of gears and ball bearings. The company is planning to erect a new building early next year.

Washburn shops of the Worcester Polytechnic Institute, which manufactures sensitive drilling machines and twist drill grinders, are doing a thriving business in both these lines. The production is necessarily curtailed by the inability to secure competent workmen in large enough numbers. If the manufacturing capacity could be increased a greater amount of business could be done. The Washburn shops are sending machines abroad, in spite of the serious handicap because of the rates of exchange. At the present time there are several machines awaiting shipment to England and Belgium.

Charles E. Hildreth, president and general manager of the Whitcomb-Blaisdell Machine Tool Company, has been elected a vice-president of the New England Foundrymen's Association.

The new shop recently completed by Sleeper & Hartley, Inc., builders of special wire machinery, is already taxed to the limit with new orders, and tentative plans are being made for another new addition. The company now employs over 100 men. It makes a specialty of wire-forming machines, used in fashioning wire for all sorts of purposes. The product comprises 60 types of machines, many of them used for making springs. The company is three months behind in its deliveries.

If it were possible to secure machinists to increase its working force, the shop of the Francis Reed Co., 43 Hammond street, would be producing twice what it produces today, according to officials of the company. It builds sensitive drilling machines of many types. The company a short time ago took over the business of the H. G. Barr Company.—W. J. B.

DETROIT, MICH.

February 16, 1920.

"Speed up production" seems to be the slogan among most of the metal plants in this city and suburbs. This apparently is the only solution at present to most of the problems that are so puzzling to industrial leaders here. Labor is not over abundant, and even if it was, housing conditions are keeping away a great many skilled mechanics. Consequently every possible measure is taken to meet the production demand by intensified operation. That means that an employee is expected to do more than he has ever done before. At the same time he is paid in proportion to what he does. That is the reason some men here are earning ten and twelve dollars a day and sometimes more, while others are not getting so much.

Greater production is the appeal that comes from every plant. It must be that in Detroit as elsewhere, or prices and conditions will continue as present for no one knows how long.

The great automobile plants are so pressed with orders that unless production is vastly increased it may be six months or a year or more before everyone who is expecting a new car this year realizes his expectation.

Most of the brass manufacturers are doing more or less automobile work, so they are not affected to any great extent when trade falls off in other lines they are producing. The demand for builders' supplies, plumbing, etc., is not very strong just

at present, and manufacturers in these lines have no trouble whatever filling in on automobile work.

General conditions in the trade, however, have not changed materially during the month, with the exception, perhaps, that production is more intense. The car shortage is causing more or less trouble and shipments are somewhat delayed. Coal is not too plentiful, but it is not believed this condition will cause any great amount of trouble. There still is a strong demand for help—especially skilled mechanics. Top notch wages are paid, but it is hard to get good men at that. Some of the local plants are advertising strongly for men in the east.

The Detroit Lead Pipe Works are planning the erection of a new office building at Second avenue and Larned street. A number of old structures will have to be demolished before actual construction is started.

The Ford Motor Company has well under way several acres of new buildings in the rear of the Highland Park plant. When completed these will add materially to the company's present capacity. About 45,000 persons are given employment in this plant, divided into day and night shifts, and all who have worked six months are receiving at least six dollars a day and from that up, according to grade of employment.—F. J. H.

PHILADELPHIA, PA.

FEBRUARY 16, 1920.

The metal working shops of Philadelphia continue busy in virtually all lines. The volume of business taken since the first of the year has been exceptionally heavy, and a fair volume of new business is being booked steadily, although the rush has been stopped to some extent by the recent tightness in the money situation and the foreign exchange depression. The latter influence especially is expected to have a quieting effect on business with local concerns, as a fair share of their orders were from foreign buyers who in the present adverse condition of exchange have deferred or in some cases cancelled their orders.

But despite the financial tightness, the majority of shops here have enough work to keep them busy for some months without a new order. Work is so plentiful that the labor problem is getting acute in some lines. Good men are very scarce, especially first-class moulders and patternmakers. This situation is making itself felt in a tendency toward higher wage levels. Although there have been no strikes or concerted movements in demand for higher pay in the Philadelphia district, a number of groups of workmen have recently been granted increases. In every case individual shop bargaining and adjustment have prevailed for a settlement.

Unless the money situation becomes permanently unsettled or labor becomes unreasonable, which does not appear likely, there is every reason to believe that this will be a banner year for all the metal industries of the neighborhood. The need of the country for metal products is known to be greater than ever before. Machinery needs are heavy everywhere, and inquiries have been very numerous for mechanical equipment of all kinds.

Good orders for new equipment and machinery have been placed recently by a number of the large Delaware River shipyards, which are discarding antiquated or wornout machinery for labor-saving appliances. During the war and when the yards operated under government direction, the chief aim was to get production regardless of costs, but now that private operation is in effect, more attention is being given to low production costs.

One of the largest expansions planned in this district is by the Westinghouse Electric and Manufacturing Company at its Essington plant. About $5,000,000 is to be spent on new buildings and machine-tool equipment. The building extensions are to be an erecting shop, 125 x 300 feet; heavy machine shop, 125 x 600 feet; light machine shop for small turbines, 130 x 500 feet, and a warehouse, 80 x 500 feet. When these additions are completed the entire turbine and auxiliary equipment department of the Westinghouse Company will be located here. The turbine manufacturing capacity will be increased about 50 per cent.

The Wicaco Screw & Machine Works, Seventh and Wood streets, is planning a new two-story building, 82 x 321 feet, to cost about $100,000.

The Quaker City Motor Parts Company, Tioga and Richmond streets, is planning additions to its plant to cost $25,000.

The Philadelphia Storage Battery Company has begun work on a three-story addition to its Ontario street plant to cost about $50,000.

The Abrasive Company, manufacturers of grinding wheels, are planning a one-story addition to the plant at James and Fraley streets.

The Reading Valve and Fitting Company, Reading, Pa., has announced an increase in capital stock from $200,000 to $300,000.

New officers recently elected for the American Metallurgical Corporation for the ensuing year are: F. J. Ryan, president; S. R. Vanderbeck, vice-president; W. L. Taylor, treasurer; J. W. Hawley, assistant treasurer, and S. H. Ourbacker, secretary. The corporation is a specialist in all electro-metallurgical and electro-thermic problems. Its capitalization has been increased from $50,000 to $200,000. Headquarters are in the Franklin Trust Building in this city.

The Philadelphia district salvage board of the War Department has awarded to the Illinois Smelting & Refining Company 47,000 pounds of sheet lead and 32,000 pounds of lead pipe at 7.55 cents a pound, and to the United Lead Company 35,000 pounds of lead scrap at 7.50 cents.

At a recent sale of 1,000,000 pounds of old mixed small cartridge cases and clips at the Frankford Arsenal the following bids were received: Bridgeport Brass Company, 13.65 cents a pound; Benjamin Harris & Co., 13.07 cents; White & Brothers, 13.00 cents; American Brass Company, 12.30 cents; National Metals Company, 13.57 cents.

The Buzz Spring Company of Reading, Pa., has been incorporated with a capitalization of $100,000 for the manufacture of springs and other metal products. The incorporators are Lawrence C. Bright, Rudolph Pabska of Reading and W. A. Bear of East Greenville, Pa.

According to figures given out last week, 183 manufacturers of all kinds of machinery from all parts of the country are now represented by exhibits and agencies in the permanent machinery exhibition in the basement of the Bourse Building here. This number is a considerable increase over the number of exhibitors one year ago.

At the 294th meeting of the Philadelphia Foundrymen's Association held recently in the Manufacturers' Club, two new members were elected, namely, the Marine Brass Company, T. P Dunham, president, and the North Wales Foundry Company, George W. Haag, president. Dr. H. Reese, of Temple University, made an address on "Iron and Its Making from Ore to the Casting." Thomas Devlin, the 80-year-old president of the association, was in charge of the meeting.

The Enterprise Manufacturing, hardware specialties, will build a three-story reinforced-concrete and brick addition, 115 x 164 feet, to its plant at Third and Dauphin streets. The estimated cost is $150,000.—G. B. G.

COLUMBUS, OHIO

FEBRUARY 16, 1920.

There is some strength shown in the metal market in Columbus and central Ohio. During the past month trade has been fairly good, when the unusual conditions are taken into consideration. Demand from metal-using concerns is generally good and rather large orders have been booked. As a rule a majority of the purchasers desire immediate shipment, as deferred orders are not booked to any extent. Generally speaking the tone of the trade is satisfactory and future prospects are considered good.

Metal dealers anticipate a good demand for the first part of the year at least and have made preparations accordingly. Shipments are rather slow in arriving because of car shortage and railroad congestion. There are no labor troubles among metal-using concerns in central Ohio territory.

The North Lawrence Aluminum Company, of North Lawrence, Ohio, has been chartered with a capital of $30,000 by William H. Longworth, Thomas H. Longworth and Harmon S. Richardson.

The Gem Brass Manufacturing Company of Cleveland has been chartered with a capital of $35,000 by C. W. Poppleton, M. Gerber, A. Goldman, E. Kopp and R. E. Heimberger.

The Jewel Brass Manufacturing Company of Cleveland has been incorporated with a capital of $35,000 by Sidney N. Weitz, Marc J. Grossman, Irwin N. Loesser, Harry Pott and Fred B. Fishman.

The Economy Brass Manufacturing Company of Cincinnati has been chartered with a capital of $20,000 by M. Bachrach,

W. E. Rutter, Philip P. Bundman, Joseph M. Pfeiffer and Louis Katz.

The Atlas Metal Company of Cleveland has been chartered with a capital of $100,000 by A. Lipkowit, Samuel Horwitz, F. B. Draeger, M. A. Friedman and W. K. Stanley.

The authorized capital of the Akron Bronze and Aluminum Company has been increased from $50,000 to $150,000. The company is at Akron, Ohio.

The Shelby Metal Products Company of Shelby, Ohio, has been chartered with a capital of $40,000 by C. O. Sellen, P. F. Stokes, C. C. Fish, Anna R. Fish and D. W. French.

The Holan Metal Products Company of Cleveland has increased its capital from $50,000 to $150,000.—J. W. L.

CLEVELAND, OHIO

FEBRUARY 16, 1920.

Some slowing down in general manufacturing, at least as regards plans for the more distant future, is noted with the advance of the new year. This is noted principally among metal industries and allied plants where need for new machinery and similar equipment has been voiced during the last few months. Indirectly much stress is laid upon the development of the automobile industry in these parts, to which many plants in this industry cater. These automobile interests have not definitely gone on record as to what they actually propose to do in the way of increased motor car production, although it is admitted that present business outlook requires that an enormous production of cars be developed. This last is based largely upon the showing made by salesmen at the recent automobile show here, where orders for cars placed during the show would total $24,000,000, automobile interests say. This would mean that about 15,000 cars were ordered during the show. If these figures are borne out by actual business, the prediction for enormous business during the entire year of 1920 would seem to be well founded.

At least one firm in the metal industry that is not at all disturbed over any future conditions, and which is preparing to expand into national activity is the General Supply Company, jobbers in electro platers' equipment and supplies, which was incorporated early in January for $250,000. This business has been established for the last ten years. It was organized and managed by P. H. McAuliffe, a leader in this branch of the industry. The incorporation was effected so that territory could be added, so that the firm may serve plating interests in a national way. Heretofore most of its activity has been confined to the Cleveland district. Officers elected following incorporation are: President, P. H. McAuliffe; vice president, I. E. McAuliffe; secretary, F. W. Buescher; treasurer, George H. Miller. Directors include the officers and C. F. Buescher and E. F. Buescher. Besides being well known to the local trade, Mr. McAuliffe is also known nationally as a director in the Metal Finishers Equipment Association. His firm was one of the first to enter this organization. F. W. Beuscher has lately been identified with other business, but is not new to the plating field, as he was for years identified with chemical interests. The business will be continued at 1314 St. Clair avenue, this city, where the entire three story building has been taken over.

The Marsh Motor Car Company is going ahead with its plans for moderate priced car production. Upon the 100 acre tract that was taken over the first unit in the factory is nearing completion. Plans call for the erection of housing on a 25 acre parcel of the tract, to accommodate plant workers. When actual manufacturing starts at least 900 workers will be employed.

Shortage of labor in metal industry plants in this vicinity may be reduced at an early date if the plans of school authorities are carried out as indicated at the moment. Improvement in the machinery and tool room equipment of East Tech. and West Tech high schools soon will be made by the addition of government-owned machinery, which has been purchased at 15 per cent of the cost to the government at the time it was ordered during the war. This equipment for the present will consist of milling machines, lathes, hammer, grinders and a screw machine, and will be augmented by other supplies as the progress of manual training at the schools expands.

Blazing oil in the core room of the Superior Foundry Company did $50,000 damage, according to L. M. Miller, vice-president. The fire was caused by an overheated fuel pipe. A floor space of 10,000 square feet was damaged.

Metal workers in the body department of the Rubay Company walked out for a brief time following a dispute on piece work wages. Most of the men have returned, according to Paul La Croix, general manager.

An employe of the Glauber Brass Manufacturing Company would have saved money by buying his children toys instead of taking several brass castings from the Glauber plant. He explained to the judge he wanted them for the children to play with. The idea cost him a $25 fine, which, the judge said, would have bought more suitable toys.

Plans for expansion are announced by the National Copper and Smelting Company, with the acquisition of a building in the eastern manufacturing section. The building will become the Cleveland plant of the company, and will duplicate the Detroit plant production, seamless drawn copper and brass tubing.

Renewed production in most plants of the metal industry in the Cleveland district is continuing, despite the statement of steel workers union officials that the organized steel plant employes will not return to work, although the national body has ordered the steel strike officially ended. For a time it was feared that lack of steel production would hamper all industry. As a matter of fact steel production is now close to normal, and the places of men who walked out have been filled, according to employment department officials at the different plants. Applications from former employes will not be turned down, it is said, though there are few places not filled by this time.—C. C. C.

TRENTON, N. J.

FEBRUARY 16, 1920.

Prohibition is having its effect upon foreign labor in the Trenton metal plants and many of the foreigners are anxious to return across the seas. Every effort is being made to keep foreigners here so that work might be kept up in the plants. Even with the high wages now being paid some mechanics appear to be dissatisfied with their lot. Early in January a conference was held at the State House, which was largely attended by manufacturers and their representatives and leaders of industry in the state, for the purpose of discussing ways and plans in the furtherance of a movement to induce foreign laborers to remain in New Jersey. Rev. Dr. Newton Dwight Hills, of Brooklyn, N. Y., who has made a study of the matter gave an illustrated address on "Americanization," and told of some of the methods employed by the state of Michigan to retain its foreign labor. Many mechanics have been drawn to towns in Canada because of the prohibition enactment in the United States.

The members of the Trenton Smeltermen's Union are awaiting a reply from the employers in the matter of a decision concerning a demand for a new wage contract to extend for six months. The manufacturers have indicated that they are not agreeable to this plan, but want it to be extended to one year. No demands have been made by employes of other metal plants here and none are expected.

The Trenton plants are enjoying busy times at the present. The Skillman Hardware Manufacturing Company placed a number of hard wheel polishers and lock moulders at work during the past week, while the Westinghouse Lamp Company is daily hiring new hands.

A number of Red suspects arrested in the recent raid conducted in Trenton later lost their jobs in the metal plants. Many of these were employed at the plant of the John A. Roebling's Sons Company and forfeited their jobs. When the suspects were released by the Federal authorities they were halted at the Roebling mill gates by guards. They were relieved of their buttons bearing their photographs and told to keep away from the plant. This action was taken as a precautionary measure to prevent a possible outbreak at the mill. Other plants took similar action.

Duncan Mackenzie Sons Company lost a number of valuable copper dies lately when their porcelain plant was destroyed by flames. The company will now set men to work in making new dies at the iron plant operated by the concern.

Joseph H. McGrory, secretary of the Katzenbach & Bullock Company, Inc., chemical dealers, has gone to Akron, Ohio, to become western representative for the concern. Mr. McGrory

was formerly manager of the naval stores department of the company at 100 William street, New York. Later the company will establish an office in London.

Karl G. Roebling, president of the John A. Roebling's Sons Company, has been honored by Chairman Will Hays of the National Republican Committee by being appointed a member of the sub-committee that is to frame up the policies and platform for the 1920 campaign for president. Mr. Roebling is one of the busiest men in the state with his many business interests, but will take the time to look after his political appointment.

That the metal manufacturers will continue to enjoy an era of prosperity is the belief of the manufacturers here. Orders on the books of the firms indicate that the coming spring and summer will find busy times. Some of the firms have been compelled to advertise for help, claiming that expert mechanics are very scarce in some instances.

Charles Rosenberg & Company, Inc., of Montclair, N. J., has been incorporated with $5,000 to conduct a hardware business. The incorporators are Moses Rosenberg and William Rosenberg, of New York, and Charles Rosenberg, of Montclair, N. J.

The Miniature Incandescent Lamp Corporation has purchased a three story brick building at Eighth avenue and High street, Newark, and will use the same as a factory. The same company has also acquired from Vosburgh Miniature Lamp Company a similar building on Day street.

The Greater New York Metal Bed Company of Brooklyn has purchased a large plot of ground in Newark and will erect a factory to be used for the manufacture of metal beds. The building will cover 30,000 square feet. The company will remove from Brooklyn to Newark and the building including equipment will cost $200,000.

White Metal Manufacturing Company, Clinton street, Hoboken, N. J., will erect a six story factory and a three story foundry. Plans for the factory are now being built.

The American Metal Bed Company, 272 Sherman avenue, Newark, will make alterations to its factory. The L. E. Waterman Company, pen manufacturers, will erect a series of buildings at Newark to cost $1,000,000. The main building will be eight stories high and the wings will be 80 by 240 feet.

J. Goldenberg, Inc., of Jersey City, N. J., has been incorporated with $50,000 capital to deal in metal goods. The incorporators are Joseph Goldenberg and Harry Raskin, of Jersey City, and Samuel Greenstein, of New York.—C. A. L.

LOUISVILLE, KY.

FEBRUARY 16, 1920.

Business is both good and poor at the present time, there being a very active demand with the casting and foundry concerns, while the sheet metal working companies are not doing much business. Many of the sheet metal companies, after losing out on distillery and brewery business, managed to keep very busy on government work, but as the latter classification has been completed and there is no demand for condensor tubes, brine equipment, etc., the sheet metal houses are finding things quiet.

On the other hand the foundries which are casting brass, copper, zinc, etc., are picking up an excellent run of general business and are behind on general deliveries, as business has been piling up faster than they have been able to get it out. At the present time some of the shops are enlarging and increasing forces to take care of additional work.

The Independent Brass Works has recently closed a deal for a portion of the old Louisville Railway Shops, at 1716-1718 Cedar street, where the company will have about three times the floor space that it has had in its old casting shop at Center and Walnut streets. Manager J. W. Rademaker, who is back on the job, after having been ill at his home for a week or more, stated that the concern was practically forty days behind on new business.

Due to a near zero spell of weather in mid-February, the radiator repair companies have had an excellent volume of business. Up to this time the coldest weather of the year had been seventeen above, and auto owners had become careless in the matter of protection, resulting in all shops being crowded with work.

The Peerless Manufacturing Company, Louisville, manufacturers of oxidized and other equipment for fireplaces, including andirons, screens, guards, etc., has recently been reorganized. Paul F. Semonin, of Louisville, has become active manager, and Roderick Cooper, formerly New York salesman for the Louisville Varnish Company, has become sales manager. The company is remodeling the plant, installing new motors, wiring, heating equipment, etc., and plans to install central station service instead of operating its own power plant. Improvements are being made in the moulding foundry and other sections. New equipment is being installed for dipping and spraying japanned goods, while the plating and oxidizing departments are being improved. The company is also enlarging its sales force and starting out on an active campaign for new business. Mr. Cooper is just back from a convention of tile and grate men at Cleveland.

Manager E. E. Sherman, of the Vendome Copper & Brass Company, reports that deliveries have been very poor for the past few days due to bad weather and bad traffic facilities in the East and North. However, manufacturers are now giving prompt attention to orders, deliveries coming through much better, with orders taken on the basis of twenty-day shipment. Mr. Sherman reported sheet metal work as light.

The Moran Flexible Steam Joint Company, and the house of Falls & Withers, both handling general casting work in the finer metals, have been doing an excellent volume of business and report good prospects.

"Tom" Hines, of Hines & Ritchey, reports that the company is being kept busy in connection with castings for the Standard Milk Machinery Company, and also sheet work. These two concerns are operated by the same interests.

The Louisville Fire Brick Company reports a very active demand for material from the steel and iron mills, railroads, refiners, etc., and that it is principally held back by the severe car shortage, which is preventing the company from shipping more than a small percentage of orders.

The Columbia Sanitary Manufacturing Company, Louisville, manufacturers of bathtubs and sanitary plumbing equipment, has announced a large increase in capital, and plans for doubling the capacity of the plant. The same interests control the Laib company, which jobs a general line of plumbing, mill and heating equipment.

P. A. Vogel & Sons, jobbers of plumbing, heating and mill supplies, have located in a new double building at Second and Main streets, where the concern has double its former floor space.

Work is to start within a few days on a thirteen-story addition to the group of buildings housing the big Belknap Hardware & Manufacturing Company.

The Louisville Street Railway Company and the local telephone companies have not been buying much material or making many improvements due to inability to secure higher rates than franchise rates. The same condition is true of the Louisville Gas & Electric Company and the Louisville Railway Company.

The Dixie Belle Refining Company, Louisville, Warren Callahan, president, has announced plans for a $250,000 refinery, which will require considerable heavy equipment.

Announcement has been made by the Kentucky Wagon Manufacturing Company of heavy domestic and export orders for automobiles and the placing of orders for material to cover production of more than 6,000 pleasure cars.

The United Casket Company, recently incorporated in Louisville, with a capital of $300,000, will erect a large casket plant and install departments for manufacturing handles, plating, finishing, etc.

A plant will be installed by the Springfield Sprayer Distributing Company, Louisville, which will manufacture non-corroding sprayer devices for spraying trees, grain, fruit, etc. J. M. Bucker is one of the incorporators of the $100,000 company.

The O. K. Stove & Range Company is installing a large foundry addition and other buildings, costing $60,000.

Amended articles have been filed by the stamp and stencil house of the Beecher Foweler Manufacturing Company, increasing the capital from $15,000 to $50,000.

The Charles H. Connor Company, tin plate roofers and operators of a metal working plant, is rebuilding damaged buildings, burned at a loss of $40,000.

George L. Smith, head of George L. Smith & Co., metal workers of Louisville, featuring galvanized metal work, recently died at the age of seventy-one years.

F. S. Schardein, head of the house of F. S. Schardein & Sons Company, heating and plumbing experts, recently died at the age of seventy-one years. He was one of the pioneers in the trade.

MONTREAL, CANADA

FEBRUARY 16, 1920.

Business during the last month has shown a continued growth in volume and a certain feeling of confidence and optimism is pervading the industrial trade here because of the settlement of all labor troubles and strikes. This city at the present time has no labor troubles or strikes in any branches of the trades, the first time for over a year that everything was on a satisfactory basis between employer and employee. There is every sign of the boom developing which will tax the country's productive capacity to the limit. With the jobbers and manufacturers shelves bare as a result of the ability and eagerness of the great majority of the population to buy, and the building industry in such a prosperous condition it may be expected that the present condition will endure until such demands have been satisfied. A great North American shipbuilding entente between Canada and the United States is foreshadowed in the visit to Montreal this past week of David Rodgers, shipbuilder and general works manager of the Skinner & Eddy Corporation of Seattle.

Though no details have been given out of the scheme prominent shipping concerns have been approached, particularly in Montreal. A part of the scheme is the establishment of a shipbuilding yard in Montreal and at several other strategic points throughout Canada and the United States, involving an initial outlay of millions of dollars.

Rapid progress is being made in the new addition to the National Acme Screw Machine Products, Ltd., located on De Courcelles street and Grand Trunk Railroad. This is a subsidiary or Canadian branch of the National Acme Corporation, Cleveland, O. Owing to the increased building operations now going on all over the different provinces there is a heavy demand for plumbing fixtures, fittings and valves, and the James Robertson Company factory located on Inspector street, are running to their fullest capacity and are behind on orders owing to the heavy demands from their branch houses in the different provinces.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Aluminum Company of America state that there is no foundation to the rumor that they have bought or intend to buy the Kidd Farm, Maryville, Tenn., to enlarge their plant.

The Guyan Machine Shops, Logan, W. Va., are interested in quotations on electric hoists, lathes, punches, shears and motors. They operate a brass foundry, brass machine shop, brazing and soldering departments.

The Driver-Harris Company, Harrison, N. J., manufacturers of nichrome products, have awarded the contract for the construction of a three-story 500x100 ft. factory on Middlesex street. They operate a grinding room, casting shop, rolling mill and brazing department.

The E. A. Couturier Band Instrument Company, Laporte, Ind., has been incorporated with $500,000 capital stock to manufacture band instruments. The directors are E. A. Couturier, E. G. Greenman, O. L. Sutherland, A. T. Henry, M. G. Lathrop, T. J. Strang and R. N. Smith.

The Boicourt Machine Company, Ft. Worth, Texas, which was recently incorporated with $30,000 capital, is planning the erection of a gray-iron and brass foundry. They will also operate a bronze and aluminum foundry, brass machine shop, casting shop and brazing department.

H. Kramer & Company, 1330 West 21st Place, Chicago, Ill., metal refiners, have awarded the contract for the construction of a two-story, 60 x 65 ft., office, a two-story, 30 x 85 ft. warehouse and a one-story, 125 x 200 ft. foundry, on Loomis street and 21st place. Estimated cost $165,000.

White & Brother, Inc., Philadelphia, Pa., manufacturers of "Certificate Metals," casting copper and brass and bronze ingot, have opened a middle western office in the Chamber of Commerce Building, Detroit, Mich., with L. D. Kluver in charge. They will also have warehouse facilities in Detroit for the shipment of the metal.

The Frost Manufacturing Company, Kenosha, Wis., manufacturers of brass goods and general plumbing and steam heating supplies, have awarded contracts for the erection of two plant additions, each 66 x 76 feet. They operate a foundry, brass machine shop, tool room, grinding room, casting shop, spinning, stamping, soldering, plating and polishing departments.

The Regle Brass Company, Greenville, Mich., which was recently incorporated with $100,000 capital will erect a plant 60 x 200 feet. J. B. Couture is president and general manager. They operate a brass, foundry, brass machine shop, tool room, grinding room, cutting-up shop, stamping, plating and polishing departments. They are in the market for equipment and supplies.

The die-casting department of the **H. H. Franklin Manufacturing Company,** Syracuse, N. Y., has been incorporated as a separate unit, as the Franklin Die-Casting Corporation. The new organization will take over all die and foundry equipment previously owned by the H. H. Franklin Manufacturing Company and will turn assume all die-casting contracts entered into by that company.

The Hardinge Conical Mill Company, with main office at 120 Broadway, New York, and branch offices in Denver, Salt Lake City, Spokane, and London, announce a change in name to the Hardinge Company. This change of name does not mean that they are in any way eliminating the Conical Mill from their efforts, but was considered desirable on account of the recent enlargement of their activities and a desire to simplify the corporate name.

The Westerly Brass Company, Westerly, R. I., is making extensive changes and additions to its plant. They recently have contracted for a new line of work, which calls for the installation of air compression with the necessary electrical equipment. A battery of molding machines is being installed, and one plant addition is now under construction, while erection of another will be started in the spring. They operate a brass, bronze and aluminum foundry, brass machine shop and grinding room.

The Plant Engineering & Equipment Company, of New York City, manufacturers of the well-known Corliss Valve Steam Traps, Mason Condensation Meters and other power and heating specialties, announces the opening of its twenty-sixth office to care for the increasing demands for its products. Mr. M. Wm. Ehrlich, experienced in consulting and contracting engineering, will be the New Jersey manager in charge, with headquarters at Newark, N. J., and a sub-office at Lyndhurst, N. J.

The Norton Silver Company, East Norton, Mass., was recently incorporated for $50,000 by Allan H. Bell, president; Alfred B. White, treasurer, and Andrew Lowden. They manufacture silver plated ware, soft metal casting for ornamental and advertising purposes, bronze castings, and do silver and bronze plating and lacquering. They also manufacture bronze molds for soft metal casting for the trade. They operate casting, plating, polishing, buffing, lacquering, soldering and mold making departments.

The Aluminum Goods Manufacturing Company, Manitowoc, Wis., has acquired the plant and business of the Bremer-Waltz Corporation, St. Louis, operating an aluminum rolling mill and kitchen utensil factory, which it will continue as plant No. 5, under the management of Joseph Topic of Manitowoc. This company operates large works at Manitowoc and Two Rivers, Wis., and Newark, N. J. They are investing approximately $2,000,000, in extensions and new equipment for the Wisconsin factories.

The Rapid Electrotype Company, Canal, Race and Elm streets, Cincinnati, Ohio, has awarded the contract for the construction of a two-story, 100x215 ft. factory, on McMiken, Race and Elm streets, which will cost about $300,000. They operate smelting and refining, casting shop, tinning and plating departments. They state that they are building special casting machines and special plating apparatus that have never been made before in the electrotype business.

The New Jersey Zinc Company, 160 Water street, New York City, announces the contemplated construction of additional zinc oxide and lithopone plants to meet the growing demand for these products. The company plans to construct its plant at strategic geographical points so as best to serve its customers located in various parts of the country. Construction work will be commenced immediately on zinc oxide and lithopone plants in Colorado and Pennsylvania. This company does smelting and refining and operates rolling mills.

At the annual meeting of the **Michigan Smelting & Refining Company,** held in the company's administration offices at Detroit, Mich., John H. Searles was elected president and general manager, to succeed the late Joseph Sillman, founder of the business. Other officers and directors were elected as follows: Herman Sillman, vice-president; Henry Levitt, secretary-treasurer. Directors—John R. Searles, Emory W. Clark, Walter P. Crysler, Leo M. Butzel, Henry Levitt, Norman Sillman, and Charles O. Patch.

In addition to the district sales offices recently announced by **The Booth Electric Furnace Company,** we have just been advised that they have opened a Detroit office in charge of **Mr. M. A. Beltaire, Jr.,** at 805 Hammond Building, as well as an office at Birmingham, Alabama, in charge of **Gassman and Cunningham,** Brown and Marx Building. This company reports the sale of twenty of their Booth rotating electric brass furnaces, which includes a number of repeat orders. These orders cover all four sizes from 250 to 2,000 pounds.

The Cleveland Osborn Manufacturing Company, Cleveland, O., have arranged to have their business restored to the former name—The Osborn Manufacturing Company—by which the trade has known them since 1892. In November, 1919, the capital stock of the company was increased to $2,000,000 and their plant capacity was doubled. The main office and factory are located at 5401 Hamilton avenue, Cleveland, Ohio. Branch offices and warehouses are maintained in New York, Detroit, San Francisco and Milwaukee, as well as a branch office in Chicago.

Cooper's Brass Works, Inc., of Ogdensburg, N. Y., are having plants prepared for the construction of a factory for the manufacture of electrical fixtures, plumbers' supplies and brass articles, on the Wright property in the east end of that city. The estimated cost is $100,000. Communications to the company should be addressed to Abraham Cooper, 16 Nassau street, Brooklyn, N. Y. The company will operate a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room, casting shop, cutting-up shop, spinning, stamping, tinning, soldering, plating, polishing, japanning and lacquering departments.

The Maxon Furnace and Engineering Company announce their organization, with headquarters at Muncie, Ind. This company will handle the entire output of the Maxon-Premix Burner Company. It will supply and install furnaces and burners for all industrial purposes where oil and gas are used as fuel, and will furnish repair parts, including refractory linings, for all apparatus furnished by it. It will undertake the solution of engineering problems relating to the combustion of oil and gas, including the design, layout and installation of the entire combustion equipment, where so desired. Col. John Stephen Sewell, member of the American Society of Civil Engineers, formerly an officer of the Corps of Engineers of the Regular Army, is president of the new company, and H. R. Maxon, president of the Maxon-Premix Burner Company, is vice-president and chief engineer.

Several additions and changes in the sales and advertising departments of the **Square D Company,** of Detroit, Mich., became effective February first. E. A. Printz, formerly district sales manager of the Chicago territory, was made sales manager, A. MacLachlan continuing in the capacity of secretary and director of distribution. D. M. Stone, formerly district sales manager of the Pittsburg territory, was made district sales manager of the Detroit territory. J. A. Jaques, formerly in charge of the New York territory as district sales manager, was given the district sales managership of the Pittsburgh territory, and H. W. Spahn, district sales manager of the Buffalo territory, was placed in charge of New York. D. H. Colcord, formerly of the department of publicity of the Westinghouse Aid Brake Company, of Pittsburgh, was appointed director of research engineering.

CONTRACT DECISION

Plaintiff brought action to recover for the breach of contract by defendant for the purchase of 150 tons of antimonial lead. On affirming a judgment for the plaintiff the Appellate Court held that where defendant contracted to purchase of plaintiff certain "Newark antimonial lead, running approximately from 15 per cent to 18 per cent antimony and not above 1 per cent arsenic," and accepted a certain quantity shipped but refused to accept further shipments unless they were found to be absolutely free from copper, and defendant's witnesses testified no antimonial lead is produced "absolutely free of copper," and there was no evidence that the amount of copper supposed to be in the antimonial lead was sufficient to impair its value or render it unsuitable to defendant's purposes, then defendant's refusal to accept shipments unless found to be absolutely free from copper constituted a breach of the contract for which the plaintiff would be entitled to recover.

Ruling on the effect of a provision in a contract as to the prohibition of a given substance in ore, the court said that the expression in a contract of prohibition against the presence of a given substance in ore sold would, under ordinary canons of construction, exclude any implied exclusion of any other substance. (American Metal Co. vs. U. S. Reduction Co., 205 Ill. App., 492.)

KEEP THE LAMPS SHINING BRIGHTLY

A good many industrious and cleanly disposed housewives, like Aladdin of old, believe in rubbing their metal lamps. Aladdin got what he wished for when he rubbed his glim producer, but the housewife generally gets, in the course of time, what she doesn't want; namely, a shabby appearing lamp, for it doesn't take long to rub the lacquer off metal.

Lamps wouldn't be permitted to remain shabby very long if housekeepers knew how simple a process it is to re-lacquer or re-enamel them. Paint dealers, druggists and dealers in plumbing supplies sell the lacquers and enamels in small-quantity containers. Directions for applying usually come with them.

If desired, it is possible to make a lamp look like a new one. For instance, a plain brass lamp may be enameled in white or ivory by using the proper undercoating. Other preferred effects are as easily obtainable. So while Aladdin could get something with his lamp that the women of the present day cannot get, they may console themselves by the thought that they can do things with their lamps that he couldn't do.

INTERNATIONAL NICKEL COMPANY

FINANCIAL STATEMENT

CONSOLIDATED GENERAL BALANCE SHEET DECEMBER 31ST, 1919

ASSETS

Property	$48,917,691.79
Investments	1,432,872.21
Inventories	7,890,148.32
Accounts Receivable	1,747,503.16
Loans	15,000.00
Cash	3,137,635.70
	$63,140,851.18

LIABILITIES

Preferred Stock	$ 8,912,600.00
Common Stock	41,834,600.00
Accounts Payable and Tax Reserves	2,358,812.44
Preferred Dividend No. 57 Payable Feb. 2nd, 1920	133,689.00
Accident and Insurance Funds	322,003.91
Surplus April 1st, 1919	8,180,254.88
Profit and Loss (Balance as per Statement)	1,398,890.95
	$63,140,851.18

CONSOLIDATED GENERAL PROFIT AND LOSS STATEMENT
NINE MONTHS ENDING DECEMBER 31ST, 1919

Earnings		$4,326,897.96
Other Income		79,562.27
Total Income		$4,406,460.23
Administration and General Expense	$400,750.74	
Reserved for U. S. & Foreign Taxes (Estimated)	654,341.11	1,055,091.85
Net Income		$3,351,368.38
Depreciation and Mineral Exhaustion		1,551,410.43
Profits		$1,799,957.95
Dividends		
Preferred No. 55 Paid Aug. 1st, 1919	$133,689.00	
" No. 56 Paid Nov. 1st, 1919	133,689.00	
" No. 57 Payable Feb. 2d, 1920	133,689.00	401,067.00
Balance		$1,398,890.95

NEW YORK, February 2d, 1920.

ANNUAL EXHIBIT AT PRATT INSTITUTE

Thursday evening, March 11, will be observed as "Visitors' Night" in the School of Science and Technology of Pratt Institute, Brooklyn, N. Y. From 8 to 9 o'clock all the shops, laboratories, and drawing rooms of the school will be open to the public, giving an opportunity to all persons interested in industrial education to observe the students at work in the various courses and to inspect the results and methods as well as the equipment and general facilities of the institute for conducting this kind of industrial training.

The School of Science and Technology provides instruction in industrial electricity, practical electricity, technical chemistry, mechanical drawing and machine design, strength of materials, stationary steam engineering and power plant operation, marine steam engine operation, internal combustion engine work, machine work and toolmaking, forge work, foundry practice, wooden boat and shipbuilding, roof framing and stair building.

This school is now giving instruction in its evening courses to more than thirteen hundred men who are regularly employed in various vocations and who use these courses as a means to prepare themselves for more effective service.

EDISON'S VIEWS

On February 11, 1920, Thomas A. Edison, the great American inventor, celebrated his seventy-third birthday and was interviewed by many reporters. On the present-day industrial problems he expressed himself as follows:

"I'm glad that the eight-hour day had not been invented when I was a young man. On my birthdays I like to turn for a moment and look backward over the road I have traveled. Today I am wondering what would have happened to me by now if fifty years ago some fluent talker had converted me to the theory of the eight-hour day and convinced me that it was not fair to my fellow workers to put forth my best efforts in my work.

"This country would not amount to as much as it does if the young men of fifty years ago had been afraid that they might earn more than they were paid. There were some shirkers in those days, to be sure, but they didn't boast of it. The shirker tried to conceal or excuse his shiftlessness and lack of ambition.

"I am not against the eight-hour day or any other thing that protects labor from exploitation at the hands of ruthless employers, but it makes me sad to see young Americans shackle their abilities by blindly conforming to rules which force the industrious man to keep in step with the shirker. If these rules are carried to their logical conclusion, it would seem that they are likely to establish a rigid system of vocational classes which will make it difficult for the workingman to improve his condition and station in life by his own efforts.

"Of course, I realize that the leaders of union labor have their political problems and that they must appeal to the collective intelligence of their followers, which is lower than the average individual intelligence of the same men, but there ought to be some labor leader strong enough and wise enough to make trades unions a means of fitting their members for better jobs and greater responsibilities. I wonder if the time will ever come when the unions, generally, will teach their members how to be better workmen, and train the ablest and the most ambitious to become bosses and employers. If that time ever does arrive, trade unionism will be one of the world's greatest forces in social progress, and I think there will be a much better understanding between capital and labor.

"No, I don't believe in a six-hour day if a man is interested in his work. If a man is interested in what he's doing he won't keep his eye on the clock, but he'll see the thing through. Hard work won't hurt anybody who likes it.

"Men are more efficient than they were fifty years ago. We have more machinery now, and some day all our work will be done by machinery. Then we'll be more efficient still. The men will be paid high wages and will simply direct the machines. We'll even have automatic machinery make the machines. We're working on some of those things here now."

AMERICAN METAL BUYS VOGELSTEIN

The American Metal Company has acquired the entire business of L. Vogelstein & Company. The purchase gives the American Metal Company, which has heretofore been mainly interested in zinc, lead and minor metals, a prominent place in the copper market, as the business of L. Vogelstein & Company was mainly done in this metal.

Among the assets of the Vogelstein company taken over by the American Metal Company is the copper refinery at Chrome, N. J., in which Vogelstein up to recently had a minority interest. He now has the controlling interest by purchase from the United States Smelting, Refining & Mining Company.

Mr. Vogelstein acquired a substantial interest in the American Metal Company at the recent sale of metal company shares held by the Alien Property Custodian. Other purchasers of shares at the same time were the Cerro de Pasco Copper Company, J. Horace Harding, Louis T. Haggin, Charles D. Barney & Company and others affiliated with the Cerro de Pasco Company.

SALE OF FACTORY SITE AT NITRO

The first commercial industry to locate at Nitro, West Virginia, the War Department's "Smokeless Powder City," will result from the purchase by the Central Foundry & Supply Co. of Columbus, Ohio, of a factory site from the Charleston Industrial Corporation of Charleston, West Virginia. The sale has been approved by the Ordnance Salvage Board and the Director of Sales, in accordance with a contract under which the Government sold Nitro to the Charleston Corporation last December. The "Smokeless Powder City" site, which was selected by the Central Foundry & Supply Co., consisted of 5½ acres of land and contained such buildings as a sheet metal shop, a brass and iron foundry, a pipe and electric shop, a welding shop and numerous smaller structures. The purchasers will establish a branch plant at Nitro, West Virginia.

TRADE CATALOGUES

Plating and Polishing Supplies—a monthly price list from The Warren Products Company, 296 Broadway, New York City.

The Joseph Dixon Crucible Company, Jersey City, N. J., will gladly send their Booklet No. 190-A, "Crucibles—Their Care and Use," to any foundryman so requesting.

Pots and Boxes—a neat little folder, on cyanide, chloride and lead pots, and carbonizing and annealing boxes issued by the Quigley Furnace Specialties Company, 26 Cortlandt street, New York City.

The Grand Haven Brass Foundry, Grand Haven, Michigan, was recently damaged by fire. They are now in a new factory, operating a brass, bronze and aluminum foundry, brass machine shop, plating and polishing rooms at increased capacity.

The Metal & Thermit Corporation, New York, N. Y., has issued and will distribute on request a large 1920 map calendar showing railroad time zones in the United States and Canada, also showing illustrations of interesting Thermit welding jobs as applied to stern frames of ships, rail special work and locomotive frame repairs.

Portable Belt Conveyors for handling material horizontally or at a slight incline are described and illustrated in a new folder entitled "Type B Portable Belt Conveyors." This folder, just published by the Portable Machinery Co. of Passaic, N. J., contains prices of these machines which are made with 16" wide belt and in standard stock sizes as follows: 12'-6", 16', 19'-6", 23', 23'-6", 30', 33'-6" and 37'.

METAL STOCK MARKET QUOTATIONS

	Par.	Bid.	Asked.
Aluminum Company of America	$100	$550	$625
American Brass	100	218	224
American Hardware Corp	100	150	150
Bristol Brass	25	33	36
International Silver, com	100	30	30
International Silver, pfd	100	92	97
New Jersey Zinc	100	280	287
Rome Brass & Copper	100	290	325
Scovill Mfg. Co	100	400	415
Yale & Towne Mfg. Co	...	250	275

Corrected by J. K. Rice, Jr., & Co., 26 Wall Street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

COPPER.

January transactions in copper, estimated at between 200,000,000 and 250,000,000 pounds, including 65,000,000 pounds for export, showed a decrease of nearly 50 per cent from December transactions. December orders, however, were exceptionally heavy, probably the largest in any single month in the history of the industry. During latter half of January and first half of February there was a sharp falling off in the volume of business, car shortage and weather conditions being restricting features in nearby trading. Domestic consumers, however, were largely covered for requirements during first quarter and even second quarter, having been important participants in the heavy buying movement. Producers, being well sold, were naturally conservative, and exerted no pressure to make sales in an unwilling market. Demoralized exchange rates declined to a point where foreign buyers lost interest finding the odds against them too heavy. Producers' prices during January were advanced ¼ to ½c. per pound for first and second quarter deliveries to domestic buyers, but sales for export commanded ¼c. higher than price to home buyers. In the first half of February producers' prices receded ¼c.

In the open market, however, there was considerable pressure in making sales and price fluctuations covered a range of 2c. per pound, registering a net decline of ½ to ¾c. per pound. Thus, while producers' prices were slowly but steadily rising under heavy sales, in the open market, prices were gradually declining. The result was to bring about a closer relationship between the major and minor markets. At the end of January, first and second quarter deliveries were offered at 19.00-19.50c. for prime lake; 18.50-18.75c. for electrolytic and 18.25c. for casting. By February 13, New York prompt and February deliveries were held at 19c. for prime Lake, 18.50c. for electrolytic and 18c. for casting copper, while March, second and third quarters were held each at ¼c. per pound higher than the preceding delivery.

TIN.

With heavy stocks of tin available to American consumers in January, in addition to the fact that large consumers' requirements were well covered, it was not surprising to find sentiment in this country not in sympathy with the London market where an aggressive campaign for higher prices was in progress. Prices here, however, reluctantly, were gradually carried upward by the dramatic movements at London and the sensational advances made at sources of supply in the Far East. Spot Straits after advancing 5.00c. per pound to 65c. during first fortnight—sales almost invariably being made below cost of importation at the time—gradually declined to 60.25c. by the end of the month, when Banca and American pure tin were both available at 60c. per pound. Under the continued influence of demoralized exchange rates, there was a further decline during the early days of February when Straits was held at 57-57.50c., with Banca and American pure available ot ¼c. less per pound. These prices were unchanged until February 9, when a recovery began which on February 13 had carried the market to 58.50c. for Straits and Banca, and to 58.25c. for American pure. At the same time 99 per cent tin could be bought at 57.75c. per pound.

LEAD.

Expectations in the lead industry as expressed at the end of 1919 were realized in January, when the strength of the market, due to stringency in supplies caused a net advance of 1.00c. per pound in producers' prices and ¾c. per pound in the open market. Large inquiries from consumers, early in the month, could not be satisfied because of scarcity. The spread between prices of the leading interest and in the outside market ranged from ¼-½c. premium New York, ⅛-¼c. premium East St. Louis, in the outside market over the basis of the American Smelting & Refining Company. Producers, by the middle of the month, were reported withdrawn from the market, being probably unable to book further contracts during the following six weeks. Late in January, while there was some irregularity noted in prices, quotations were 8.25c. East St. Louis, 8.50c. New York, the official base of the American Smelting & Refining Company, while in the open market, 8.35-8.45c. East St. Louis, 8.75c. New York were asked. Early in February, the outside market again advanced prices ⅛c. per pound, the demand continuing and supplies decreasing. By February 9, the leading interest announced another ¼c. per pound rise to 8.50c. East St. Louis, 8.75c. New York, while the open market immediately quoted 8.50-8.62½c. in the Western market and 8.75-9.00c. in the East, these figures remaining unchanged at time of going to press.

ZINC.

Advancing prices for zinc in the London market, early in January—the market here being wholly dependent upon foreign sales for the time being—caused more or less excitement in the trade here. Prices by the end of the first week had advanced about ½c. per pound, the highest figures being 9.50c. East St. Louis, 9.85c. New York. During the succeeding week, fluctuations followed London prices, but by the end of first fortnight, the market was quiet, the extreme weakness of foreign exchange having effectually checked foreign buying. Domestic inquiries about this time were in fair volume and prices naturally declined in the market's adjustment to the law of supply and demand. The reaction carried prices to 9.00-9.05c. East St. Louis, 9.35-9.40c.

New York for prompt and nearby metal. Future positions were available, each at 5 points less than preceding delivery. In February, the decline was continued as home demand slackened and foreign demand remained inert because of continued unfavorable exchange. By February 5, prices were down to 8.60-8.65c. East St. Louis, 8.95-9.00c. New York, after which a recovery carried to 8.75-8.85c. East St. Louis, 9.10-9.20c. New York, on February 13, when the market was active and firmer.

ANTIMONY.

The antimony market was strong, with advancing prices all through January, making a net and total rise of .50c. per pound from 9.75c. for wholesale, duty paid metal, New York, to 11.25c. for prompt and nearby positions. The market is understood to be closely controlled, with supplies held by strong hands in this country. After-the-war demand has exceeded all expectations. The month closed with few offerings in the market, but resale lots in bond, in limited quantities, were available at 10.50-10.62½c. per pound. Demand at the beginning of February continued active, two advances having been made by February 13, which carried prices to 11.62½c. for prompt, duty paid metal New York wholesale delivery, and 11.75-11.87½c. for jobbing spot lots.

ALUMINUM.

The January aluminum market registered no change in prices from the December closing figures which were 31.50-32.50c. for virgin ingots, 31-32c. for remelted 98-99 per cent pure, 29-30c. for No. 12 alloy remelted and 42.20c. for sheets 18ga and heavier. Large consumers are understood to have their ordinary requirements well covered over first of 1920. Interest in the trade in first half of February was centered in importations from Norway and France, it being current opinion that supplies in this country were not equal to the demand expected in the latter half of 1920. No price changes had been made up to February 13.

SILVER.

Demand for silver from China, in January, was the outstanding feature. Prices fluctuated within a range of 7.00c. per ounce, the opening being at $1.30½, the highest at $1.37½ and the closing at $1.31 per ounce. Fluctuations in February up to the 13th, were not so violent, the highest being $1.34½ on the 2d, after which the range was between $1.32 and $1.34 February 11, declining to $1.32 on February 13. World production of silver is entirely inadequate to meet the constantly increasing demand.

QUICKSILVER.

Prices of quicksilver after advancing to $93 per flask on January 12, from $85 at the end of December, lost all of the advance a few days before the end of the month. By February 4, plentiful supplies and some falling off in demand, caused a further decline to $80 per flask, this price being unchanged up to February 13.

PLATINUM.

High prices for platinum continued in January, the December closing, $160 per ounce, being unchanged until January 26, when a decline to $155 per ounce was noted. This price was unchanged during first half of February.

OLD METALS.

Confidence in the old metals market, early in January, was responsible for advances all along the list, ranging from ¼ to ½c. per pound on coppers and other items to 2c. per pound on No. 1 pewter and block tin pipe. By the end of the month, not only had the entire advance been lost, but a further reaction occurred. Early in February, light copper was down to 14c., strictly crucibled wire to 17c. with uncrucibled at 16c. Aluminums were down to 26c. for clippings, 23.50c. for old cast and 24c. for old sheet. Pewter was back to 38c. and block tin pipe down to 50c Pessimism reigned, aggravated by the generally disturbed financial and business conditions as well as by severe weather. The outlook was for a probable further decline in prices almost immediately.

WATERBURY AVERAGE

Lake Copper. Average for 1919, 19.55. 1920—January, 19.25.
Brass Mill Zinc. Average for 1919, 8. 1920—January, 9.75.

JANUARY MOVEMENTS IN METAL

Copper:	Highest.	Lowest	Average.
Lake	20.50	19.00	19.761
Electrolytic	19.50	18.50	19.023
Casting	19.25	18.25	18.809
Tin	65.00	60.25	62.886
Lead	9.00	8.00	8.740
Zinc (brass special)	9.85	9.35	9.574
Antimony	11.25	9.75	10,529
Aluminum	33.00	31.50	32.25
Quicksilver (per flask)	$93.00	$85.00	$89.952
Silver (cts. per oz.)	137	128.5	132.82

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities, which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, February 16, 1920

NEW METALS

	Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Electrolytic, carload lots	18.50
Lake, carload lots	19.
Casting, carload lots	18.
TIN—Duty Free.	
Straits or Australian, carload lots	59.75
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	8.75-9
ZINC—Duty 15%.	
Brass Special	9.25
Prime Western, carload lots	9.05-9.15
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	...
100-lb. f. o. b. factory	...
Ton lots, f. o. b. factory	31-33

ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	11.65
NICKEL—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.	
Ingot	43.
Shot	43.
ELECTROLYTIC	45.
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	$1.90
BISMUTH—Duty free	Nominal $2.65
CADMIUM—Duty free	Nominal $1.40
CHROMIUM METAL—Duty free	Nominal
COBALT—97% pure	$2.50-3.00
QUICKSILVER—Duty 10% per flask of 75 pounds	$80.00
PLATINUM—Duty free, per ounce	$155.00
SILVER—Government assay—Duty free, per ounce	$1.30
GOLD—Duty free, per ounce	$20.67

Metal Prices, February 16, 1920

INGOT METALS

Silicon Copper, 10%	according	to	quantity	49	to55
Silicon Copper, 20%	"	"	"	36	to40
Phosphor Copper, guaranteed 15%	"	"	"	32	to40
Phosphor Copper, guaranteed 10%	"	"	"	29	to36
Manganese Copper, 30%	"	"	"	65	to72
Phosphor Tin, guarantee 5%	"	"	"	75	to78
Phosphor Tin, no guarantee	"	"	"	74	to79
Brass Ingot, Yellow	"	"	"	14½	to16
Brass Ingot, Red	"	"	"	20	to22
Bronze Ingot	"	"	"	22	to24
Parsons Manganese Bronze Ingots	"	"	"	23	to25
Manganese Bronze Castings	"	"	"	29	to39
Manganese Bronze Ingots	"	"	"	17	to22
Manganese Bronze Forgings	"	"	"	30	to40
Phosphor Bronze	"	"	"	24	to30
Casting Aluminum Alloys	"	"	"	32	to34

OLD METALS

Buying Prices.		Selling Prices.
16½to17½	Heavy Cut Copper	18 to18½
16 to16½	Copper Wire	17½to18
14½to15	Light Copper	16½to17
16 to16½	Heavy Machine Comp.	17½to18
11½to12	Heavy Brass	12½to13
9 to 9½	Light Brass	10½to11
9 to 9½	No. 1 Yellow Brass Turnings	11 to11½
14 to14½	No. 1 Comp. Turnings	16 to16½
4.25	Heavy Lead	4.90
4.25	Zinc Scrap	5.00
10 to13	Scrap Aluminum Turnings	11 to14
21 to23	Scrap Aluminum, cast alloyed	23.50to25
24.00	Scrap Aluminum, sheet (new)	26.50
36.00	No. 1 Pewter	40.00
18.00	Old Nickel anodes	20.00
26 to28	Old Nickel	30 to32

BRASS MATERIAL—MILL SHIPMENTS

In effect January 7, 1920.

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.25¼	$0.27¼	$0.29
Wire	.25¼	.27¼	.29
Rod	.23¾	.28	.30
Brazed tubing	.37	..	.41¾
Open seam tubing	.37	..	.41¾
Angles and channels	.38	..	.42¾

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.26½	$0.28½	$0.30¼
Wire	.26½	.28½	.30¼
Rod	.25	.29¼	.31¼
Brazed tubing	.38¼	..	.43
Open seam tubing	.38¼	..	.43
Angles and channels	.39¼	..	.44

SEAMLESS TUBING

Brass, 30½c. to 32½c. per lb. base.
Copper, 32c. to 34c. per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	29½c. net base
Muntz or Yellow Metal Sheating (14"x48")	25¾c. " "
Muntz or Yellow Rectangular Sheets other than Sheathing	26¾c. " "
Muntz or Yellow Metal Rod	23¾c. " "

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	29½c. net base
From stock	31½c. " "

BARE COPPER WIRE—CARLOAD LOTS

22¾c. to 23¼c. per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order	31½c. per lb. base
100 lbs. to 300 lbs. in one order	32½c. " "

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 12½c. basis, less 8 per cent.

Casks, jobbers' prices	14c.
Open casks, jobbers' prices	14½c.

ALUMINUM SHEET AND ROD

Sheet Aluminum, base price, 50c. per lb. Coils 46c. per lb.

ROD.

B. & S. Gauge.

¼" to 1" Advancing by 32nds
1" to 5/8" " " 16ths } 98% rolled, 43.10 cents per lb.
2 5/8" to 3½" " " 8ths

3/8" to ¼", 98% rolled and drawn.....48.80 cents per lb.

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over at N. Y. tin price, 100 lbs. or more, 5c. over Pig Tin. 50 to 100 lbs., 12c. over, 25 to 50 lbs., 15c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

LEAD FOIL

Base price—figured on base price of lead at the time.

PLATERS' METALS

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from $1.33 to $1.36 per Troy ounce, depending upon quantity.

Rolled sterling silver, $1.26 to $1.30.

NICKEL ANODES

85 to 87% purity	.55c. per lb.
90 to 92% "	.57½c. per lb.
95 to 97% "	.60c. per lb.

Supply Prices, February 16, 1920

CHEMICALS

Acid—		
Boric (Boracic) Crystals	lb.	.25
Hydrochloric (Muriatic) Com., 20 deg	lb.	.04
Hydrochloric, C. P., 20 deg	lb.	.10
Hydrofluoric, 30%	lb.	.40
Nitric, 36 deg	100 lb.	7.28
Nitric, 42 deg	100 lb.	7.90
Sulphuric, 66 deg	lb.	.02½
Alcohol—		
Denatured	gal.	1.00
Alum—		
Lump	lb.	.05½
Powdered	lb.	.07
Aluminum sulphate, commercial tech	lb.	.15
Aluminum chloride solution	lb.	.16
Ammonium—		
Sulphate, tech.	lb.	.07
Sulphocyanide	lb.	—
Argols, white, see Cream of Tartar	lb.	.80
Arsenic, white	lb.	.15
Asphaltum	lb.	.35
Benzol, pure	gal.	.65
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate)	lb.	.10½
Calcium Carbonate (Precipitated Chalk)	lb.	.15
Carbon Bisulphide	lb.	.08
Chrome Green	lb.	—
Cobalt Chloride	lb.	2.00
Copper—		
Acetate (Verdigris)	lb.	.60
Carbonate	lb.	.29
Cyanide	lb.	.65
Sulphate	lb.	.09
Copperas (Iron Sulphate)	lb.	.04
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.80
Crocus	lb.	.15
Dextrin	lb.	.25
Emery Flour	lb.	.10
Flint, powdered	ton	—
Fluor-spar (Calcic fluoride)	ton	—
Fusel Oil	gal.	5.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	—
Shellac	lb.	—
Iron Sulphate, see Copperas	lb.	.04
Lead Acetate (Sugar of Lead)	lb.	.25
Yellow Oxide (Litharge)	lb.	.20
Mercury Bichloride (Corrosive Sublimate)	lb.	1.92
Nickel—		
Carbonate Dry	lb.	.80
Chloride	lb.	.55
Salts, single, bbl.	lb.	.17
Salts, double, bbl.	lb.	.15
Paraffin	lb.	.25
Phosphorus—Duty free, according to quality		.38-45
Potash, Caustic, Electrolytic 88-92%, fused	lb.	.32
Electrolytic 70-75%, fused	lb.	.26
Potassium Bichromate	lb.	.35
Carbonate, 80-85%	lb.	.27
Cyanide, 98-99½%	lb.	.22
Pumice, ground	lb.	.05
Quartz, powdered	ton	—
Official	oz.	—
Rosin	lb.	.08½
Rouge, nickel	lb.	.40
Silver and Gold	lb.	.60
Sal Ammoniac (Ammonium Chloride)	lb.	.18
Sal Soda	lb.	—
Silver Chloride, dry	oz.	1.43
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	.85
Soda Ash, 58%	lb.	.02½
Sodium—		
Biborate, see Borax	lb.	.10½
Bisulphite, tech.	lb.	.07
Cyanide, 96 to 98%	lb.	.25
Hydrate (Caustic Soda)	lb.	.15
Hyposulphite	lb.	.03¾
Nitrate, tech.	lb.	.06
Phosphate	lb.	.05
Silicate (Water Glass) bbls	lb.	.03
Sulpho Cyanide	lb.	.90
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.25
Sulphur (Brimstone)	lb.	.03
Tin, Chloride	lb.	.65
Tripoli Composition	lb.	.02½
Verdigris, see Copper Acetate	lb.	.60
Water Glass, see Sodium Silicate, bbls	lb.	.03
Wax—		
Bees, white ref. bleached	lb.	—
Yellow	lb.	.60
Whiting	lb.	.05
Zinc, Carbonate	lb.	.24
Chloride	lb.	.15
Cyanide	lb.	.45
Sulphate	lb.	.05

COTTON BUFFS

Open buffs, per 100 sections (nominal).		
12 inch, 20 ply, 64/68, cloth	base,	$90.05
14 " 20 " 64/68, "	"	118.85
12 " 20 " 84/92, "	"	136.05
14 " 20 " 84/92, "	"	183.30
Sewed buffs, per pound		
Bleached and unbleached	"	.70
Colored	"	.63

FELT WHEELS

		Price Per Lb.
White Spanish—		
Diameter— 6" to over 16"	Thickness—½" and ¾"	$4.00
" 6" and 8"	" 1" to 3"	3.35
" 10" to 16"	" 1" to 3"	3.25
" over 16"	" 1" to 3"	3.35
" 6" to over 16"	" over 3"	3.40
Grey Mexican—		
Diameter— 6" to over 16"	Thickness—½" and ¾"	$3.90
" 6" and 8"	" 1" to 3"	3.25
" 10" to 16"	" 1" to 3"	3.15
" over 16"	" 1" to 3"	3.25
" 6" to over 16"	" over 3"	3.30